CONTACT DERMATITIS

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CONTACT DERMATITIS

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To my wife

EDITH M WALDBOTT

Foreword

SOME may consider it presumptuous for an allergist to concern himself with the treatment of Dermatitis, and thus encroach upon the territory of the dermatologist Yet, those who have studied this disease must admit that a great deal of progress has been made in the treatment of dermatitis by utilizing developments in the field of allergy Conversely, such dermatologists as Bloch, Jadassohn, and especially Sulzberger and his disciples, who pioneered in this field long before allergy was recognized as a separate science, have not only greatly stimulated the field of allergy, but have taught individual allergists a great deal about dermatology For many years, I, personally, have visited and observed and consulted with dermatologists on questions of mutual interest in my practice This, I feel, has helped me greatly to understand the problems discussed in this monograph

The search for the causes of contact dermatitis is one of the most intricate detective tasks with which physicians are confronted As it is the main purpose of this monograph to aid general practitioners, as well as specialists in this task, such aspects of the disease as nomenclature, the history of the disease, and certain controversial points in the underlying immunology are eliminated In this monograph, the term 'Contact Dermatitis" is used for the "Eczematous contact type of Dermatitis" in distinction from "Atopic Eczema" which is to designate what some have termed "Atopic Dermatitis," "Neurodermatitis," 'Infantile Eczema," 'Prurigo Besnier" For the theoretical data underlying our knowledge of the disease, I wish to refer the reader to the proper sources in the bibliography Such books as the one by Schwartz and Tulipan, or that by Sulzberger, and most text books on Dermatology and Allergy will serve this purpose The text of this monograph is confined to data which bear upon the practical side of the subject In brief an attempt is made to follow the clinician into his office and to proceed with the practical management of the patient

I purposely refrained from presenting a chemical analysis of most causative objects such as the various types of plastics, the constituents of rubber, etc To the practitioner and even to most specialists it matters little for the management of a certain case whether a black dress or a particular rubber article contains this or that chemical In some instances a detailed analysis of these materials would undoubtedly detract from the purpose of this book Research workers, or those called upon to testify at an industrial trial, are again referred to the complete and thorough studies by Schwartz and Tulipan who have devoted many years to analyzing the chemical compounds responsible for industrial dermatitis

In chronic cases it is imperative that the patients acquire as much knowledge as possible concerning their disease in order to cooperate effectively with the doctor. For this reason, he may wish to have his patient read the pertinent parts of this monograph. The glossary appearing on pages 192 to 199, therefore, is more extensive and more elementary than is necessary for the use of a physician.

During my thirty years' experience in practicing allergy, I have learned that careful observation of the pattern of dermatitis, produced by a certain object, is by far the most reliable clue for the detection of its cause. I, therefore, endeavored to collect and classify as many patterns of actual cases as possible. The material accumulated in this book is largely derived from my own practice and from that of my former associate, Dr. J. J. Shea of Dayton, Ohio, whose wide experience and keen sense of observation have been of utmost value in this work. Photographs assisted us greatly in retaining the impressions of certain designs observed in patients with contact dermatitis. During the war years, however, when photographic material could not be obtained, many interesting and very characteristic cases could not be photographed. In such instances, the patterns were carefully sketched on diagrams and attached to the patient's record. Thus, it was possible to utilize the material in this monograph.

Another important contribution to this study was afforded by the answers received in reply to circular letters directed to dermatologists and allergists throughout this country. These letters asked them to supplement our work with cases from their own practices. In this manner a number of additional designs came to my attention for inclusion in this book, which I had not observed personally. I wish to express my gratitude to all those who cooperated, particularly to Doctor Francesco Ronchese of Providence, Rhode Island, who permitted me to study his photographs before he published them in his book on *Occupational Marks*.[178] To the many other contributors whom I am unable to mention individually, I am most appreciative.* Furthermore, I wish to acknowledge the untiring assistance rendered me by my present associate, Dr. Karl Merkle, in compiling data from the literature, in organizing the glossary, the index, in aiding in the photographic work and in the search for the causative agents in my patients. His many valuable suggestions have been incorporated in this book. Finally, Mr. George Schliepfer deserves much credit for his photographs of patterns on the hands, depicted in Chapter VIII, and for many useful suggestions. His great care and thorough approach in taking the pictures was indeed appreciated.

G. L. W.

* Another book *Les Dermatoses Allergiques* by A. Tzanck and E. Sidi. Masson et Co. Editor 1950 has been a valuable source of information to me.

Preface

In contact dermatitis a cure depends largely on the detection and removal of the cause How careful observation of the design of a lesion enables us to establish a causative diagnosis is clearly illustrated by the following instance in which neither an elaborate history nor other extensive investigative procedures were required

Mr D K, (Case 1) 49 years of age, had a contact dermatitis on the *radial portion of both hands, involving wrist and basis of thumb and index* finger (Figure 1) This had been present for more than 15 years When he consulted me, the dorsal surface of his right hand showed a skin graft According to his statement, this was necessitated by burns from too intensive x ray treatment administered for relief of his dermatitis The left hand showed evidence of an x ray burn superimposed on a chronic dermatitis of the venenata type When the patient was first seen, his hands were in the pockets of his trousers, approximately one half being exposed, a part of the lesions in the area described was visible Because lesions on the dorsal surface of the hand bring to mind an object with which contact exists through ' reaching into something and because according to his statement he had the persistent habit of keeping his hands in his pockets, it was concluded that something in the patient's pocket might be responsible for the lesion Inspection of the lining of the pocket showed it to be practically black with dirt The right pocket contained a key chain with keys, the left one, his silver coins A patch test for nickel sulfate produced a strongly positive reaction By avoiding the nickel objects, by replacing the dirty lining with a clean one, and by eliminating friction in this area through keeping his hands out of his pockets, an eruption of 15 years standing was cleared up within a few days Indeed, only half a minute was required to discover the cause of this chronic, intractable ailment

Here is another equally striking experience to demonstrate the value of this procedure

At the exhibit of the A M A Convention in Chicago in 1948, a doctor studying my photographs of patterns brought to my attention a lesion of dermatitis on his right hand, localized on the dorsal surface about the knuckles I could not ascertain the specific cause, but I did state that this general pattern suggests contact with such objects as a woman's purse, a bag, a brief case, in other words, articles into which he might habitually



Figure 1 X ray burn superimposed on chronic dermatitis due to nickel Nickel particles of coins and key chain had soiled pocket lining Patient had habit of keeping hands in pocket

reach Within a short time another doctor presented his right hand to me with a dermatitis distributed in exactly the same manner on the dorsal surface In discussing the question of "reaching into something,' the rather obvious fact was brought out that most physicians are in the habit of reaching into their bags The lining of this doctor's bag contained a zipper (nickel) The habitual contact with this material is likely to result in considerable traumatization of this particular area of the skin Several months later one of the doctors informed me that by avoiding this contact the dermatitis of several years' standing cleared up completely No testing of any kind and no elaborate local or general therapy was needed

These cases illustrate the great diagnostic and therapeutic value of the study of the localization of dermatitis, a phase of the disease which has been somewhat neglected in the past Of course, this method is subject to minor shortcomings, as are most diagnostic procedures These will appear in the course of this discussion A thorough elucidation of other aspects of the disease, particularly of the other diagnostic methods which are at our disposal, must necessarily precede the discussion of the patterns

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CONTACT DERMATITIS

I

Incidence of Contact Dermatitis

CONTACT DERMATITIS is considered to be the most common skin disease No adequate statistics are available on its distribution among the general population, on its incidence as to sex, race, and age groups Negroes are said to be affected less often than whites North American Indians are susceptible to poison ivy dermatitis in the same degree as white people, repeated exposure to the plant being the principal determining factor On the other hand, the Eskimos of Baffin Island, who are believed to be of the same race as North American Indians, do not exhibit susceptibility to poison ivy, the plant does not exist on Baffin Island

Contact dermatitis occurs in all age groups I have observed a four weeks old infant who was sensitive to his mother's lipstick In infancy and early life, however, contact dermatitis is much less prevalent than in later years, undoubtedly because there is less chance for repeated exposure to contact agents, the requisite for the establishment of sensitization In my own practice the incidence of dermatitis among women was 63% as compared with 37% among men Of more than 32,000 cases of dermatitis in industrial workers, Brinton[19] encountered a slightly higher incidence in women than in men (Table I) Contact dermatitis is of special importance in industry, particularly since the advent of the newer synthetic materials It is believed to have become more prevalent proportionally with industrial expansion

It is well established that everybody is susceptible to the development of the disease, regardless of whether or not an allergic background exists By far the majority of cases observed in my own practice present an allergic family history or personal background of allergy This, however may not be true in general practice In an allergists's office patients are more likely to come from allergic families On the other hand, through wider experience and greater consciousness thereof, an allergist may be more likely than others to detect an allergic background For instance, I have observed recently that a relatively large percentage of patients with contact dermatitis may present no features of allergy other than a tendency to chronic sinus disease Some are not aware that this is a characteristic feature of an allergic history

TABLE I

INCIDENCE OF DERMATITIS
ENCOUNTERED BY ORLANDO CANIZARES[14] AMONG
1810 DERMATOLOGICAL PATIENTS IN AIR FORCE PERSONNEL *

1	Dermatitis venenata	17 3%
2	Pyodermias	15 1%
3	Fungous infections and "ids"	8 4%
4	Verrucae, all types	8 0%
5	Urticaria, erythema toxicum	4 6%
6	Dermatitis and eczemas	4 3%
7	Neurodermatitis	4 1%
8	Scabies	3 9%
9	Acne vulgaris	3 8%
10	Pompholyx-like eruptions	3 5%

* While the terminology of this classification is controversial this table is presented here because it illustrates the marked prevalence of dermatitis venenata

II

Mechanism

Comparison with Atopic Sensitivity The mechanism of contact dermatitis follows in general the pattern of other types of sensitization It is true it differs distinctly from the anaphylactic experiment in the guinea pig which is the prototype of an allergic reaction These differences are probably determined by the fact that the eruption is originally elicited by external irritants through direct contact not by inhaled ingested or injected antigens Thus the antibody response to the sensitivity is somewhat different In a contact type of reaction specific antibodies cannot be transferred passively to other individuals while in atopic sensitivity such transfer is possible In the anaphylactic experiment an initial injection of an antigen induces sensitization which becomes manifest upon a second injection two to three weeks later In contact dermatitis exposure of a certain area to a contact irritant tends to sensitize this area and to a lesser extent the whole skin A strong concentration of the excitant will sensitize a higher number of cases and within a shorter time than a weak concentration Re exposure within ten to twenty one days elicits the dermatitis

Basic Experiments The lesions can be reproduced in the manner in which we apply a patch test This was shown by the experiments of Strauss [77] who sensitized the skin of new born infants by directly applying poison ivy oil dissolved in acetone to the skin The incidence of his "Takes" was 73% The sensitization induced in this manner persisted for at least twenty months It was highly specific The sensitization was general not localized to the area of the skin to which the extract had been applied An attempt was made to establish poison ivy dermatitis by means other than local application of the oil Feeding the extract did not produce cutaneous sensitization subcutaneous injection sensitized only one of the ten infants Others produced dermatitis in a high percentage of individuals by the application to the skin of primin the sap of primroses [13] of nitrochlorobenzene [62] of nickel [112] and of arsphenamine [5]

The well known work of Landsteiner proved that contact dermatitis from simple chemical agents is an antigen antibody reaction Landsteiner and Chase [60] sensitized guinea pigs by injecting intraperitoneally chemical

substances combined with the stroma of red blood cells They thus produced anaphylactic shock and demonstrated the formation of specific antibodies By applying these compounds upon the skins of guinea pigs, they elicited contact dermatitis, and thus demonstrated that chemicals of known simple constitution may become effective sensitizers by virtue of their ability to combine with protein

Other Experimentation Active sensitization of experimental subjects has been accomplished by various methods The skin from which the horny layer had been removed was treated with a primula extract, the extract was rubbed into a skin traumatized by glass paper, the agent was applied to the same area daily and covered with adhesive tape or by means of a single prolonged application Sulzberger failed to produce contact sensitivity in animals by intracardiac, interpulmonary, intraperitoneal, intravenous, and intramuscular routes of administration On the other hand, it is established that ingestion, inhalation, and injection of contact agents such as poison ivy oil, will flare up an already existing lesion of dermatitis [16]

The spreading of lesions is believed to be accomplished through a slow diffusion via the lymph channels, not through the blood stream The fluid obtained from blisters of poison ivy lesions does not transfer the lesions to other sites of the skin

Personal Observations My personal experience furnishes an interesting example of acquired contact sensitization, particularly with respect to the time of appearance of the lesion following contact

I used to be able to pull out poison ivy at my summer home, having no hereditary background of any form of sensitivity I visited the place on weekends only, thus being certain of the dates of exposure One summer I developed a dermatitis on both hands from poison ivy I could readily ascertain that I had been exposed to the plant two successive times at fourteen day intervals The first symptoms occurred on the ninth day following the second exposure On the eleventh day I took an intramuscular injection of 1/20 cc of poison ivy extract, which was followed by prompt subsidence of the condition Upon intentional repetition of the contact two weeks following the second exposure symptoms did not recur until the fourth day Again an injection of 1/20 cc of extract relieved the condition The next exposure took place the following weekend, or seven days after the third exposure This time the symptoms recurred immediately Since then any accidental exposure to poison ivy has resulted in a dermatitis which appears within a few hours

This experience is in accord with the observation of others that there is an initial incubation period of from 10 days to three weeks Once sensitization has been established, symptoms follow the contact within a much

shorter period This pattern corresponds surprisingly well with the incubation period of other forms of allergy

Duration Once established, the tendency to contact dermatitis is permanent[193] Contact sensitivity frequently tends to broaden and to include agents other than the original one On the other hand, some have observed[117] that after avoidance of poison ivy for two to three and a half years, 91% were clinically cured, and 69% gave negative patch tests

III

Pathology

The pathological lesion characteristic of acute contact dermatitis is present in the epidermis; it is the formation of intra epidermal vesicles (Figure 2). This is associated with dilatation of blood vessels in the structures of the papillary layers and in the upper cutis, followed by exudation of lymphocytes and plasma. These changes are responsible for the blistering and weeping of the lesions. Perivascular infiltration with lymphocytes is noted in the epidermis and is frequently followed by secondary infection. According to a former theory, itching was thought to be due to a compression of nerve endings between the vessels and the horny layers. Recent views [143] hold that the nerve endings distributed through the skin are stimulated by either the irritant agent itself or by metabolic products. The more severe the irritation of the contact agent, the more fluid exudes and the more fibrin appears. The fluid tends to dilute the irritant, the presence of fibrin, to limit the diseased area. The process can subsequently lead to proliferation of connective tissue in the corium and of endothelial cells in the blood vessels. Through infiltration with polymorphonuclear leucocytes and through secondary infection, the vesicles are liable to become purulent (Figure 3).

It takes from a few hours to several days for a contact dermatitis to develop after exposure. The lesion is at its height between the third and seventh day subsequent to its onset. It may persist from one to six weeks depending upon its severity. Protracted exposure leads to additional changes in the epidermal cells such as hyperkeratosis and parakeratosis. Lichenification may occur, especially if there is constant rubbing (Figure 4).

Certain peculiarities of the skin explain why some agents are particularly prone to cause dermatitis. There are two important barriers to the passage of irritants through the skin, namely, the horny layer of the epidermis and the oily secretion of the sebaceous glands. Substances capable of either destroying or of passing through these barriers are most likely to reach the living cells in sufficient concentration to provoke epidermal sensitization and thus cause contact dermatitis. The principal excitants, there-



Figure 2 Acute contact dermatitis from "drawing ointment" Note intradermal vesicles X20 (Courtesy, Dr Hermann Pinkus, Monroe, Michigan)



Figure 3 Acute recurrent dermatitis of neck from strap of plastic kitchen apron Polymorphonuclear infiltrate in epidermis predominantly lymphocytes in corium Scattered eosinophils in corium and epidermis Note Vesicle open, transformed into pustule X150 (Courtesy Dr Herman Pinkus, Monroe, Michigan)

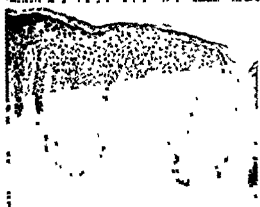


Figure 4 Chronic contact dermatitis with lichenification Note Para and hyperkeratosis with leucocytic infiltration x150 (Courtesy, Dr Hermann Pinkus, Monroe, Michigan)

fore, are agents which either remove or destroy the fatty and horny covering They are oily materials such as plant oils or certain lubricating oils, which are more readily dissolved in the fatty covering of the skin than water soluble ones, certain dyes tend to become fixed to the horny cells and thus come in more intimate contact with the epidermal cells, metallic salts which have a greater faculty for penetrating the epidermis than colloidal materials, local anesthetics which have an affinity for epidermal structures and adhere intimately to the epidermal cells

IV

Diagnosis

1. Symptomatology

THE MOST outstanding symptom of dermatitis is itching, which appears in all degrees of severity It is particularly severe in the early stage of the disease at the time of formation of vesicles Indeed, it may be the earliest sign of the disease, preceding the development of the lesions With the onset of fissures and cracks of the skin more or less intense pain develops, which is particularly pronounced when secondary infection supervenes Itching becomes again more intensified at the time when the lesions are healing

Profuse sweating of the affected areas is another common symptom This may also precede the development of the vesicles In addition, there is burning, swelling and weeping in various degrees The edema may be so extensive that the condition is mistakenly diagnosed as urticaria The true picture of dermatitis is recognized when more extensive changes in the epidermis appear In rare cases, however, urticaria will remain a part of the clinical picture of dermatitis, being either confined to the area of the skin which was originally involved or becoming generalized

Certain systemic symptoms associated with dermatitis can be attributed to the patient's psychosomatic state The patients become irritable, frightened, worried, difficult to live with There may be a loss of appetite and loss of weight Insomnia is not infrequent These symptoms can become so conspicuous that they dominate the clinical course of the disease In such cases both patient and physician alike are inclined to attribute the dermatitis to "nervousness," especially if we fail to determine the causative agents

A disturbance in the temperature regulating mechanism of the body is commonly observed, particularly in cases in which the disease has been of long duration and in which large areas of the skin are involved The patients complain of being cold and chilly They are observed shivering in mid summer Upon taking their temperature there is a slight lowering of the normal temperature This evidently represents a disturbance of the heat regulating function of the skin

Another manifestation of a contact dermatitis in the chronic state is a peculiar bluish red discoloration of the skin in and around the affected areas. This is especially pronounced in the dependent portions of arms and legs, and gives way to an excessive pallor as soon as the arms and legs are raised. It seems as though the capillary blood vessels have lost their tone and ability to contract. Lymphadenitis with pain and swelling along the lymph channels is frequently observed. This is almost always present when secondary infection supervenes. Pigmentary disturbances of the skin have been described as residual lesions following dermatitis from hydrocarbons, oils and tars. Another sequela of contact dermatitis is sweat retention.[108a] Pustular lesions occur as a result of destruction or blocking of sweat ducts and their orifices.

As to laboratory findings in dermatitis, no abnormal data are encountered. A tendency to lowered hemoglobin values has been mentioned in the literature. Blood eosinophilia is present when contact dermatitis is associated with atopic lesions. A leucocytosis and an increase in the blood sedimentation rate and fever prevail when there is secondary infection and extensive pustulation.

2 *Differential Diagnosis*

The disease most difficult to distinguish from contact dermatitis is atopic eczema. A clear differentiation between the two conditions useful for didactic purposes is presented in Table II. In practice, however, it is not always possible to distinguish the one condition from the other. In atopic eczema we frequently observe an enhanced susceptibility to contact dermatitis. Chronic dermatitis, on the other hand, may assume certain characteristics of atopic eczema. On several occasions I have seen intradermal skin reactions for inhaled and ingested antigens become positive in cases of contact dermatitis. These were patients who had contact lesions and who had no positive allergic background whatsoever; they had previously shown negative intradermal reactions. The important points in differentiating between the two conditions are the favorite localization on the flexor surfaces of knees and elbows, neck and face, in atopic eczema, the characteristic superficial papulo-vesicular lesion in contact dermatitis.

Seborrheic Dermatitis. Contact dermatitis from cosmetics on the head and face is occasionally difficult to distinguish from a seborrheic dermatitis. In the latter condition the eyelids are not as intensely involved and the itching is less severe than in contact dermatitis. The general appearance of the skin is oily, scaly, and acniform. Seborrheic dermatitis is characterized by oily yellowish scales located amidst erythematous areas. It responds

TABLE II

DIFFERENTIAL DIAGNOSIS OF ATOPIC DERMATITIS AND CONTACT DERMATITIS

		Atopic Dermatitis	*Contact Dermatitis*
Age of onset		Usually in infancy or childhood	More frequent in adults.
Personal and family background of allergy		Positive	Negative and positive
Localization		Antecubital and popliteal spaces, face and neck	Any part
Character		Papular and lichenified	Vesicles typical
Excitant		Antigens responsible for other allergic diseases (inhaled, ingested, injected)	Non-antigenic and antigenic materials.
Allergic antibody		Usually demonstrable in serum of patient	Not demonstrated
Eosinophilia		*Often present*	*Absent*
Skin Tests	Scratch or intracutaneous tests	Mostly positive (if fresh extracts are used)	Usually negative
	Contact or patch tests	Negative	Often positive
Treatment		As in other allergic diseases Elimination (diet, environment) hyposensitization with water soluble antigens	Elimination injection of plant oils

favorably to treatment with sulfur compounds Needless to say, the two conditions can appear simultaneously in the same patient

Fungous Infections. Certain fungous lesions from trichophyton, epidermophyton, yeasts, and monilia can assume an appearance which is indistinguishable from a contact dermatitis, clinically as well as histologically These lesions represent an allergic reaction to the organisms ("id" reaction) brought about through hematogenous distribution of their toxic products Some consider such lesions a manifestation of the clinical picture of dermatitis

Stasis Dermatitis. *In patients with varicose veins, varicose ulcers and* other forms of stasis and congestion, a very chronic and intractable kind of dermatitis is seen which is closely related to dermatitis of mycotic and bacterial origin The congested areas on feet and legs form an excellent medium for bacterial growth The eruption is aggravated by practically any ointment which is applied and sometimes becomes generalized "Id" eruptions may develop which once established are very difficult to treat

Nummular Eczema. Another condition of vague etiology which re-

sembles histologically and clinically a contact dermatitis is "nummular eczema" Some clinicians regard this dermatosis as a definite disease entity, while others classify it as dermatitis Nummular eczema consists of minute discrete papules which, through peripheral extension, grow into circumscribed plaques showing a tendency to central clearing The fully developed lesion thus exhibits a circular, coinlike nummular" arrangement of very small vesicles and papules from one half inch to as much as one foot in diameter [184] After healing recurrences are likely to appear at the same sites, the preferred localization being the dorsum of the hands Etiologically, "nummular eczema" is believed, but not proven, to represent an *allergic manifestation, possibly to a virus or a fungus*

Other Common Dermatoses Other skin lesions are less likely to give rise to confusion (Table III) Psoriasis as a rule does not produce itching and is conspicuous by its characteristic scaly lesions and by its typical localization on the extensor surfaces of elbows, knees and head However, the dry, eczematiform lesions on the hands, as well as those present in the anal and perineal areas, may resemble closely those of a chronic contact *dermatitis, and can be associated with considerable pruritus Scabies and* pityriasis rosea maintain a rather characteristic appearance, the latter through its brownish colored patches, the former through its discreet, severe itchy papulo vesicular lesions, localized on the folds of the body Difficulties arise when any of these diseases are complicated by a contact derma

TABLE III

PRINCIPAL DIFFERENTIAL DIAGNOSTIC CONSIDERATIONS IN CONTACT DERMATITIS

	Character of Lesion	*Localization*
Atopic eczema	Dry lichenoid scaly if acute bullous and exudative	Antecubital popliteal neck face dorsal surface of hands
Seborrheic dermatitis	Scaly erythematous greasy yellowish scales	Scalp eyebrows chest pubic umbilical region
Dermatitis Herpetiformis (*Duhring*)	In different stages Erythematous *papular vesiculous pustulous* Intense itching pigmentation atrophic scarring Lesions grouped together	Sacral triangle and scapular *areas Scalp extensor aspects* of extremities
Pityriasis rosea	Numerous yellowish pinkish reddish scaly maculae Lentil to coin size	Trunk upper arms thighs
Psoriasis	Usually single patches of various sizes scaly crusty papules sharply outlined	Scalp extensor surfaces of extremities nails
Scabies	Discrete papulo vesicular lesion arranged in whitish or dark brown line Severe itching at night Scratch marks	Interdigital bends of wrists arms knees axillary folds perimammillary umbilicus inguinal region

titis, as is frequently the case, especially when medications have been applied to the skin and sensitivity to these agents has developed

In a dermatitis manifesting a chronic course associated with marked pruritus and lymphadenopathy, the possibility of a mycosis fungoides should always be borne in mind A hemogram readily establishes the diagnosis

As a rule it is not difficult to differentiate a very acute dermatitis from such conditions as erythema multiforme or herpes simplex and other bullous and vesicular dermatoses in which there is very little or no itching In the dry chronic type, keratosis of various etiology, especially from chronic arsenic poisoning, should be considered In veterans we have seen residual lesions of dermatitis generally attributed to intolerance to atabrin In individuals returning from the seashore lesions are sometimes found closely simulating dermatitis from marine animals and from parasites of the acarina family (scabies) Several patients have been referred to me for allergic studies with chronic impetigo Their lesions resembled a dermatitis so closely that they were mistakenly diagnosed as contact dermatitis The absence of itching and the prompt response to a trial application of an antibiotic ointment or ammoniated mercury readily establishes the diagnosis Exfoliative dermatitis, Duhring's disease, and lichen planus as well as certain drug eruptions rarely present differential diagnostic difficulties However, with all these various conditions, even an expert's diagnostic judgement may be sorely tried when the lesions assume an atypical appearance They may resemble a contact dermatitis so closely that a distinction is actually impossible In such instances it is desirable to resort to a biopsy and biological examination which usually establishes the diagnosis

V

Determination of the Causes

PRACTICALLY ANY material which the skin touches directly is liable to induce a contact dermatitis Schwartz and Tulipan [156] have compiled a listing of the most common sources, which is presented in Table IV In my own, non industrial practice the articles most frequently encountered are—among plants—poison ivy, chrysanthemum, and ragweed, among dyes—black and brown in dresses, leather goods, furs, and gloves, among toilet articles—soaps, fingernail polish, hair-setting fluids, and hair lacquers, among metals—nickel and chromium, among woods—pine and cocobolo, among other articles—rubber, resins, and plastics

The means of discovering a causative agent in dermatitis are (1) his tory, (2) patch test, (3) a carefully kept diary, and (4) close observation of the morphological appearance of the lesion, its distribution, and its pattern

1 History

A detailed account of all the patient s activities preceding his most recent flare up is very helpful in a causative diagnosis Every single move he makes should be recorded While he describes his daily activities a record is made on a separate part of the history sheet of every suspected article, in order to ascertain that it is included in the patch testing program

Limitations of History There are certain limitations to the value of a history, no matter how thoroughly it is taken

A dermatitis of short duration involves an incubation period of five days to two weeks The recollection of all pertinent data covering this period is, obviously, not too reliable On the other hand, in an acute exacerbation of a chronic or recurrent lesion, the history immediately preceding the flare-up is most beneficial

There are such large numbers and varieties of objects with which we have contact in our daily life that it is often impossible to obtain an adequate listing during the first few visits Repeated questioning at every sub sequent flare up, supplemented by a contact diary kept by the patient as outlined below, will eventually lead to detection of the cause

Case 2 E T McI a 33 year old tire salesman presented a dermatitis on both hands illustrated in Figure 5 There was also some involvement of the dorsal areas of both hands in the interdigital spaces This condition had been present for four months (Dec 1950) and was at times associated with a small lesion of dermatitis on the penis and some dryness on his lips The patient had had hay fever, chronic sinus disease and a very severe case of urticaria five years ago due to aspirin tablets About ten days previous to the time he was seen by us there was an acute flare up which

TABLE IV

SPECIFIC EXCITANTS OF OCCUPATIONAL CONTACT DERMATITIS
(According to Schwartz and Tulipan [14] Modified)

Dye intermediates	*Aniline compounds nitro compounds nitrose compounds dinitrochlorobenzol* naphthalene and compounds
Fur dyes	Paraphenylenediamine paramido phenol aniline-black
Leather dyes	Nigrosine Bismarck brown amido azo-toluene hydrochloride chrysoidine amido-azo benzene
Rubber compounds and impurities	Wild rubber hexamethylenetetramine guanidines
Insecticides and Fungicides	Mercury arsenic fluorides nicotine pyrethrum or compounds creosote tar phenol petroleum distillates.
Explosives	Trinitrotoluol, tetranitro-methylaniline fulminate of mercury sensol, lead styphnate
Cosmetics	Dyes oils perfumes
Oils vegetable and mineral	Essential oils sulphonated oils cutting oils coning oils linseed oil mustard oil
Fabric dyes	Crystal violet malachite green auramine metanil yellow erio black
Rosin synthetic resins and waxes	Rosin wood rosin burgundy pitch, dammar phenol formaldehyde urea formaldehyde trichlornaphthalene all chlornaphthalenes chlorinated waxes
Woods	Mahogany (West Indian African) boxwood (Indian African) ebony (African) walnut (Brazilian) spurge manchineel (Cuba) fungus wood cocobolo silver fir silver spruce cedar teak, California redwood satinwood cocus wood
Weeds	Ragweed Rhus family (poison ivy poison sumac poison oak, Japanese lacquer) nettle bitterwood fennel sheep bur narrow leaved marsh elder Indian blanket Santa Maria feverfew sneezeweed hayfever weed (ambrosia elatior)
Flowers	Chrysanthemum, pyrethrum flower primrose daffodil, camomile, sun flower marigold hyacinth orris root tulip tobacco
Food	Mango cinnamon asparagus cloves vanilla marsh marigold rue, tomato celery fig orange grapefruit lemon lime

affected the interdigital spaces The patient had been painting tires He suspected the paint or the paint brush, perhaps rubber, as likely causes of his eruption

The appearance of the lesion, especially on his left hand, was a combination of two very characteristic contacts, namely that of the central palm type due to gripping the end of an oblong object, the other, the interdigital pattern of the kind seen in lesions from contact with fluid or semifluid materials The latter contact could have been accounted for by paint, in dermatitis from painting however, the area of greatest irritation is located where the paint runs down the index finger The central palm type pattern, on the other hand, was very suggestive of either a nickel dermatitis from the knob of a fluid soap dispenser or from the soap itself This led to the information that the patient had "experimented" with a new liquid red soap which he began using about the time when the condition started A patch test with this soap gave a 4 plus reaction There were other soaps and detergents to which he exhibited minor reactions Tests for rubber, the paint and linseed oil were negative The elimination of the soap in conjunction with bathing the hands in a potassium permanganate solution cleared up the condition within two weeks



Figure 5 Soap dermatitis in tire salesman who suspected paint or rubber as cause Note typical "soapdish dispenser" lesion in central palm with involvement of interdigital spaces

Comment In this case, the history led to the wrong conclusion about the cause, whereas the evaluation of the pattern accomplished the detection of the agent in question

Scope of History The items with which we are mostly concerned pertain to the patient's occupation, such as the ones listed in Appendix I Furthermore, inquiry is made into his contact with household articles, cosmetics, garments, medications, with special attention to those locally applied Attention should be directed to the patient's habits His handling of foods, plants, pets, and toys, as well as his hobbies, should be investigated

a. Occupation The patient's daily occupation is a vital factor in view of the agents he touches regularly in this connection Often, the onset of the eruption coincides with the beginning of his present occupation or the employment of new materials on his job It is well to consider the onset of new flare ups relative to the time of work, the patient's condition on his days off, and the effect of the job on others working with the same materials

b Season Seasonal exacerbations focus attention an plant life, garden

ing, handling food or flowers in season, on seasonal occupations or sports activities, and on the clothing worn for them For instance, a dermatitis from the steering wheel of an automobile is present in summer only, since gloves protect the hands in winter from contact with the wheel A lesion on the face from a football helmet reoccurred in late fall for three successive seasons The rubber of a bathing cap was responsible in a case of recurrent dermatitis which only appeared in summer Lesions on the hands from golf clubs and tennis rackets only develop in their particular seasons The rind of a grapefruit or orange causes a dermatitis on the hands which is limited to winter, the citrus season Shoe leather dermatitis is predominant in summer, when thin socks are worn and when there is more perspiration, which tends to dissolve and spread the causative dye In fact, any kind of dermatitis is aggravated in warm weather due to the greater tendency of the patient to perspire Dermatitis from pollen can easily be recognized by its seasonal appearance Indeed those familiar with the pollinating seasons of certain plants can promptly identify the pollen when given the exact dates of the appearance of the lesions

c. Special Days The day of the week on which the first evidence of the dermatitis occurred may provide the key to the solution For instance, Monday is distinct as washday, which involves soaps and other laundry materials On Fridays many women prepare fish, which has been proven to be the cause in one of my cases of dermatitis of the hands Days before holidays point to a woman's hair do or a man's haircut On special events such as a wedding or an anniversary, flowers, a new perfume, or a new garment may be the source Even the eye drops used before a big dinner for the purpose of making a person "feel fresh," were the cause of a severe recurrent lesion of the face

d. Hobbies A thorough investigation of the patient's hobbies is imperative Among stamp collectors, for instance, we suspect contact with glue, the covers of albums, the adhesive material of hinges the nickel of tweezers Among horseback riding enthusiasts, we consider leather, leather polishing materials, and articles used in cleaning and disinfecting stables and animals, with golfers, the leather and wood of the golf clubs, gloves, golf tees, golf polishes, plants and grasses, with hunters, gun oil and gun polishes, leather and grease of boots and hunting clothes, with photographers, certain chemicals employed in the development of pictures, with card players, plastic playing cards, card table tops, their covers or varnishes, and with those who have pets, the animal's hair and the substances employed in their care and cleanliness

e Ubiquitous Causes In questioning patients about contact with toilet articles, or in investigating such items as zippers, buttons, cloth labels, and wearing apparel, it is useful to consult the diagrams presented in

Chapter VII With all women cosmetics are important, with all children, toys, their mother's cosmetics, and clothing, in all homes, soaps, floor polishes, insect sprays, and printer's ink on newspapers

The history must further elicit whether or not drugs have contributed to the aggravation of the lesions It will be shown below how topical medication interferes with recovery from dermatitis

2 *Patch Test*

A suspected cause of a dermatitis can be verified by the patch test This test is, indeed, a valuable diagnostic aid The reaction it induces is not of the immediate wheal type Instead, it appears as a rule after 24 to 48 hours

Technique In administering the test, the suspected agent is applied upon the undamaged skin of back, thigh or upper arm If the material is a powder, it is moistened with distilled water In the case of an irritant, it must be sufficiently diluted with water or taken up in vaseline in order to avoid irritation and chemical burns The substance is then placed on a small piece of oiled silk, and held in place by adhesive tape * Thin strips of adhesive tape applied along the edges will secure the patch to the skin If there is too much trauma on the skin from the adhesive (Figures 6, 7), plain cellophane may be used and held in place by collodion, scotch tape, or any other liquid non irritating adhesive

As to the selection of items for which patch tests should be done, we attempt to choose as many materials as possible among those having con tact with the affected area The contact diary discussed below is by far the most valuable aid in this respect Table V represents a selection of patch materials suggested for routine use when there is no adequate clue for testing for specific agents Some of the modifications of the standard technique of patch tests are presented in Table V a

A positive reaction produces a small patch of dermatitis on the skin resembling the original one (Figures 8, 9) † This reaction varies in intensity, depending mainly on the patient's sensitivity to the tested agent In some instances, patch tests do not show results until four to ten days later, instead of the usual forty eight hours Therefore, the tested area should be in- spected at intervals during this period

* At the suggestion of Dr E Sidi Paris I am now employing a "non allergic tape called "Neodermotest manufactured by Vigier Laboratory, 9 Rue de la Gare Lavellois — Peret (Seine) France It contains neither rubber nor resins and through its shamrock like shape it adheres to the skin without additional support

† INTERPRETATION OF PATCH TESTS

1 plus Erythema at site of contact
2 plus Erythema and edema at site of contact
3 plus Erythema edema and beginning vesiculation
4 plus Erythema edema distinct vesiculation and at times ulceration

Hazards from Patch Testing Patch tests should not be performed indiscriminately In cases of marked sensitivity, particularly during the presence of a very acute dermatitis, such a test may become the seat of severe and troublesome new lesions, likely to last for weeks or months Moreover it may result in flare ups of quiescent eruptions and in generalization of the original lesions In such instances the patch test area begins to react within a short time often within a few minutes after its application Consequently, it is imperative that every patient be carefully observed for a period of at least thirty minutes after the application of the test material



Figure 6 (*Left*) Positive patch tests to iodine (burn plus contact sensitivity) a Typical reaction — b and c From chemical irritation (burns), possibly combined with sensitization (Courtesy Dr S Rothmann University of Chicago)

Figure 7 (*Upper right*) Patch tests negative but reaction positive to adhesive tape patch Note Center clear where suspected agent was applied

Figure 8 (*Lower right*) Strongly positive patch test Note extension beyond area of contact two days after removal of patch

TABLE V

LIST OF CONTACTANTS WHICH CAN BE EMPLOYED FOR ROUTINE PATCH TESTING*

Product	*Dilution*	*Contained in*
Adhesive plaster	—	—
Butesin Picrate	1% in white petroleum jelly	Pharmaceuticals
Formalin	5% aqueous solution	Pharmaceuticals, synthetic resins with phenol explosives, synthetized gum, disinfectant soaps preservative in milk, meat, foods, waterproofing fabrics, tanning, preserving leather
Iodoform	Powder	Pharmaceuticals
Linseed oil	Plain	Paints and varnishes
Mercurochrome	Standard solution	Pharmaceuticals
Mercury bichloride	1 1000 aqueous solution	Hats embalming fluids, laboratory reagent, depolarizer in electric batteries, intensifier in photography, electroplating aluminum, bronzing steel, coating metals, process engraving
Metaphen	Standard solution	Pharmaceuticals
Nickel chloride	5% aqueous solution	Sympathetic inks, laboratory reagent, absorbent for ammonia in gas masks, in medicine
Nickel sulfate	5% aqueous solution	Metals
Nicotin salicylate	10% aqueous solution	Agricultural spray, insecticidal spray
Novocain	1% aqueous solution	Pharmaceuticals
Oidomycin	1 10 (Lederle)	Pharmaceuticals
Oil of rose	1 10 in olive oil	Perfume
Oil of turpentine	30 0-50 0 in olive oil	Paint
Orris root	1 10 in petrolatum	Perfumes
Paraphenylenediamine	2% in white petroleum jelly	Azo dyes, aniline black, dyeing hair, furs, black and brown shades on textiles
Poison ivy (Rhus Toxicodendron)	Extract	Plant
Potassium dichromate	½% aqueous solution	Coal tar products, glass glues, adhesives, synthetic perfumes, dry colors, printing inks, paints, varnishes, matches, bleaching agents staining wood, blue print paper, photographic and laboratory reagents
Pyrethrum	Milled powder	Active ingredient in fly sprays, insecticides
Quinine hydrochloride	1% aqueous solution	Pharmaceuticals

* For a more complete list see Sulzberger [166]

TABLE V a

METHODS OF PATCH TESTING *

Type	*Purpose*	*Technique*
Covered Patch Test	For liquid and solid substances	Test material applied to normal skin covered with cellophane sealed with square of adhesive
Uncovered Patch Test	For substances adhering to skin	Irritant painted on in solution (e g nail polish) 24 to 72 hours
Celluloid chamber (Rokstad)	For volatile substances	Celluloid chamber fixed to skin with adhesive tape Irritant solvent placed on skin and covered with chamber
Vapor test (Miescher)	For volatile substances	Small tubes open at both ends fastened to skin absorbent cotton inserted into upper portion three drops of test material placed on cotton cork inserted over cotton Contact for two hours
Cellophane Collodion (Grolnick)	Avoid reaction from adhesive tape	Non moisture proof cellophane held in place by collodion
Window patch test (Guild)	For constant observation	A 1 inch glass square fixed to skin by adhesive on three sides substance introduced at open edge and then closed off
Quantitative drop method (Wedroff)	To simplify patch testing	Agent applied dropwise in alcoholic solution left on skin uncovered
Scotch cellulose tape (Sulzberger and Wise)	To increase visibility	Scotch tape instead of adhesive tape
'Artificial perspiration' (Schwartz and Peck)	To approximate the ph of perspiration fluid	Liquid used for moistening patch acidified by dilute acetic acid or alkalinized with dilute ammonia
Inunction test (Moro)	In sensitivity to adhesive tape	Substance incorporated in ointment base rubbed into skin
Provocative test (Schwartz and Peck)	If reaction for suspected agent is negative	Simultaneous application of two patches—diluted and strong concentration
Paired Patch test (Behrman *et al*)	Greater reliability	Made in duplicate with identical technique on symmetric areas
Mucous membrane test (Goldman and Goldman Farrington)	For stomatitis from direct contact	Fasten substance with collodion on small rubber suction cup held in place on surface of teeth 20 to 30 minutes

* Compiled from Weinberger W The Patch Test—Its Technic and Interpretation *Arch Ind Hyg and Occup Med* 2 565 573 Nov 1950

TABLE V b

PRECAUTIONS IN PATCH TESTING

1 Avoid primary irritants unless they are adequately diluted
2 Avoid patch tests in an acute or widespread dermatitis
3 Avoid testing repeatedly with agents known to sensitize skin easily
4 Dont let test material remain on skin too long (never longer than five days)

lest there is marked itching – the indication of an excessive reaction Repeated patch tests with the same substance should be avoided, especially if it is known to sensitize the skin easily, it may create new sensitivities (Table V b)

Negative Reactions Negative patch tests are not conclusive, since clinical sensitivity to the tested material may exist in spite of a negative patch test In some instances, the tests will be positive only if they are applied near the original lesion or on areas which have previously been subject to dermatitis The test may have been applied at a time when the skin was temporarily in a state of hyposensitivity, or the area which has been tested may have been resistant for other reasons, or the test may not have equaled the offending substance in strength of quantity Occasionally certain predisposing factors such as heat, friction, and skin maceration, are required for the production of a dermatitis In their absence the patch test area may not react positively In other instances simultaneous exposure to sunlight (photosensitivity) is required for the production of a positive contact test to a given chemical Some, therefore, recommend doing patch tests on exposed parts of the skin only

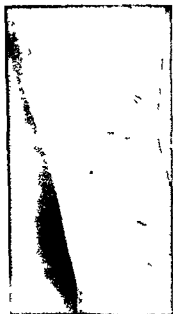


Figure 9 Positive patch test Note skin pencil marks applied on removing patch to show location of suspected agents Shampoo in upper third soap and nickel at bottom

Positive Reactions Following the establishment of a dermatitis from a primary cause, the development of secondary sensitizations from other agents is very common A positive reaction therefore, does not necessarily determine the actual primary cause

There are, furthermore, seemingly positive patch test reactions which have no diagnostic value They are due to pressure of hard particles underneath the patch, causing an erythema, there may be infection or maceration of hair particles under the patch, there may be trauma from removal of adhesive covering or sensitivity to the adhesive material In addition, primary irritants, such as acids, alkalis, carbon tetrachloride, gasoline, and certain oils, may cause a reddening vesiculation, and even ulceration of the tested area Another source of a false positive test are such materials as lipstick and nail polish the red color of which might be mistaken for a positive reaction

Standardization of Patch Testing Schwartz[158] recently established a

method of standardizing the technique of patch testing by measuring quantitatively the results of a positive patch test reaction Reactions to a patch test depend on (1) the degree of the patient's sensitivity, (2) the concentration of the substance applied, (3) the amount of the substance applied per square centimeter of skin, and (4) the length of time that it remains in contact with the skin Schwartz's technique takes these factors into account and employs known amounts of the agent in a standard concentration to a constant area of skin for a definite length of time

If the sensitizing agent is a liquid, the following technique is employed

1) A 3 sq cm piece of flannel is saturated with
2) 0 2 cc of the liquid of known concentration measured with a graduated pipette
3) This is insulated with uncoated cellulose overlapping 1 to 1½ inches on each side and
4) Fastened on the skin with elastoplast measuring 3 inches across the diagonal

If the sensitizing agent is a solid, a definite amount is dissolved in a suitable solvent, 0 2 cc of this solution is applied on a 3 sq cm piece of flannel The flannel is placed on a porcelain or glass surface until the solvent is evaporated This permits an even distribution of a known amount of the substance on the flannel, which is then applied on the skin

If the sensitizing agent is an ointment, a definite amount is spread over the surface of the 3 sq cm piece of flannel

According to Schwartz [158] the results are then recorded as follows

Substance	*Site*	*Conc*	*Solvent*	*Amount*	*Area*	*Time*	*Reaction*	*Delayed Reaction*
Amm Thioglyco	R forearm	5%	H_2O	0 15 cc	3 sq cm	24 hrs	−	+
Amm Thioglyco	L forearm	10%	H_2O	0 15 cc	3 sq cm	24 hrs	+ +	−

This method enables us to make valuable studies concerning the clinical aspects of dermatitis It makes it possible to determine

(1) The relative sensitivity of different patients by placing patches of a similar concentration on their skin and noting the degrees of the reactions

(2) The threshold of sensitivity in a certain patient by placing the same amount of various concentrations of a chemical on the patient's skin

(3) The relative sensitizing power of chemicals by placing patches of each chemical in similar concentrations on the skin of a number of normal subjects The patches are allowed to remain on the skin of these

individuals for one to three days This procedure is repeated ten to fourteen days later the time interval during which sensitivity develops The number of subjects thus sensitized by each substance and the degree of the reactions are then noted

3 *Contact Diary*

In order to enlist the patient s cooperation and to further his understanding of the disease we carry out two additional and most helpful procedures in our office The patient is given a booklet describing the common causes of contact dermatitis He is then shown a scrapbook with photographs of similar cases the causes of which have been discovered The value of this latter practice is self evident By observing lesions of others many patients are able to assist in diagnosing their own case

Furthermore cases which are not immediately solved can sometimes be traced to their cause several years later The pictures of each identified pattern are classified and kept on file When other cases are encountered with the same design and their causes detected it is possible to apply the new information to the unidentified patterns and thus relieve patients whose lesions have been an enigma for years (Note case 4 page 79)

After the patient has studied our list of causes and our photographs of similar lesions he is asked to keep what we designate A Contact Diary " He reviews carefully all his activities four or five hours previous to an acute flare up The agents with which he has had contact are then listed on a special form Rather than a lengthy and confusing description of all he has done during this time he simply enters in the diary" such items as wooden knife handle soap leather key case plastic razor etc We study this diary thoroughly eliminate all items unlikely to be the cause and add others which the objects listed suggest For instance the word wooden table" involves furniture polish oiled table cloth ink stand flowers certain foods etc We then proceed with patch testing for those agents which we consider likely causes

4 *Clues other than Pattern*

The solution to a contact dermatitis is a challenge to our detective skill more than any other diagnostic problem In this detective work the pattern is a reliable clue Before discussing this aspect however it is well to show how observation of the patient s behavior as well as the appearance of his lesion points the way for the detective

The Patient A perceptive study of the individual may narrow the search for the source of the dermatitis considerably

Environment and Activities: Individuals may be classified according to their environment and their activities For instance, the domestic house wife performs household tasks, whereas the socialite does not, obviously these two individuals have contact with a different group of substances The former is associated with the daily housekeeping items, such as soaps, cleaning powders, varnishes, polishes, etc In the latter case, we should single out cosmetics and clothing materials as objects for our investi gation

Various other categories of people might be noted In children with contact lesions on hands and face, we suspect toys or the mother's cos metics Some men use hair tonics and other cosmetics more than others Among sportsmen, our detective eye is directed toward sport apparel and sport equipment and toward the surroundings of his sports activities, with farmers, weeds, animals, insect sprays, etc are possible causes

Nervous Habits: Patients with nervous mannerisms and habits occa sionally suggest the causative agent by their behavior For instance, a woman with the nervous habit of rubbing her wedding ring upon her lower lip had developed a nickel dermatitis in this particular area through contact with the ring, aided by moisture and friction Many weeks of observation had yielded no solution, and then one day the insight came quite unexpectedly when the patient was seen rubbing her lip In another woman a lesion on the right half of the lower lip was induced in the same manner by fingernail polish

A patient who habitually ran her right hand through her hair de veloped a lesion in the interdigital area between the third and fourth fingers which proved to be the reaction to a hair-setting fluid Another case of sensitivity to a hair cosmetic appeared in a sixteen year old girl She showed a characteristic "finger-grip type" of lesion (page 69), caused by the habit of twisting her hair between three fingers Another individ ual showed a dermatitis on his fingertips due to habitually scratching his scalp, which contained a certain hair pomade A six year old child had a dermatitis on his lips and chin from the habit of constantly rubbing his black woolen mittens over his mouth He reacted to the black dye

The Lesion: To a keen observer, the appearance of the lesion throws light on the cause

a. Well Demarcated Lesions: Sharply delineated types can often be pinned down to their sources For instance, clear cut stripes suggest a dermatitis from adhesive tape (Figure 110, page 103), although such lesions may occur in other designs Others with borders less clearly defined than those from adhesive originate from certain garments They are most sharply outlined at the early stage of the eruption One of my patients with a lesion on the distal part of four fingers on one hand had a clear line of

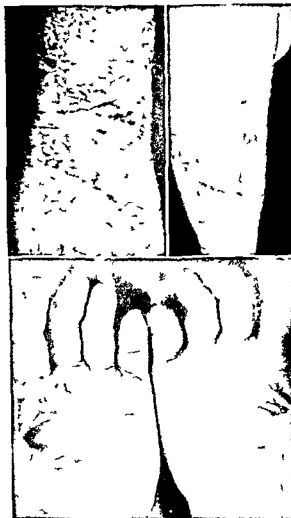


Figure 10 (*Upper right*) Plant dermatit s Note l n ear streaks of vesicles (Courtesy Dr J B Howell Dallas Texas)

F g re 11 (*Upper left*) Cl ronic dermatitis orig inally from black dye in overcoat Aggravated by fre quent use of penicillin ointment

Figure 12 (*Bottom*) Repeated contacts with tele- pl one receiver (plastic) "oblique bar" type

demarcation running across the fingers, involving the tip of the thumb Evidently this could only have been caused by dipping the fingers into a fluid or into semi fluid material Unfortunately the cause could not be detected

b Linear Streaks Linear streaks in the midst of otherwise diffusely expanding vesicles are occasionally seen in plant dermatitis especially that from poison ivy (Figures 10 17) This is either due to touching a branch or root of the plant while the affected limb is in motion or to scratching and thus spreading the poison ivy sap to new areas of the skin A very pronounced strip of dermatitis was observed running down the center of the







Figure 13 (*Upper left*) Oil dermatitis (machine worker) Note callouses pustules boils

Figure 14 (*Above*) From mustard plaster on chest Note even distribution sharp delineation Similar lesions are produced by local medications (ointments)

Figure 15 (*Lower left*) Thick knife handle (cocobolo wood) Clear area of skin fold beneath little finger suggests solid substance gripped in hand

cheek below a patient's left eye This was caused by sensitivity to eye drops

I observed a lesion consisting of several vertical streaks of dermatitis, extending from the neck downward They had been caused by the dye of a fur which rain had induced to run Perfumes have been seen to produce lesions of similar appearance In other lesions of linear shape, a central linear focus may result from friction combined with sensitivity, as in the case of a zipper

c. Individual Papules Lesions exhibiting widely distributed papules occur in dermatitis from pollen or from granules of chemicals Contact with each granule gives rise to an individual papule More intensive contact with pollen leads to a centrally confluent area with small papules spreading into the periphery

d. Other Morphological Characteristics If a dermatitis is dry and keratotic, manifesting evidence of chronicity, an occupational contact or a garment to which the patient is exposed repeatedly should be suspected (Figures 11, 12) An acutely irritated edematous and bullous lesion, on the other hand, suggests a single contact rather than repeated ones (Figure 20) Primary folliculitis and boils are indicative of irritation and infection from oil, grease, and dirt (Figure 13) Proliferative lesions point to coal tar, pitch, and petroleum products A rather uniform expansion of an irritated area with a clearly defined demarcation suggests dermatitis from an ointment or other local medication (Figure 14), or from fluid or semi fluid cosmetics By careful inspection of the lesion we can, under certain circumstances, actually detect traces of the irritating substance In two cases of leather dermatitis on the hands, we observed traces of black dye at the affected areas If folds in the skin are free from dermatitis the lesion is likely to have originated from a solid agent (Figure 15) Fluid or semi-fluid materials would gather in the folds

VI

The Pattern

1. *Atypical Patterns*

There are some contact agents producing dermatitis which have neither a characteristic localization nor a typical pattern These are plants and drugs They must be excluded from our consideration of characteristic patterns As a rule, it is not difficult to make a causative diagnosis of these lesions (Figure 18) An individual with dermatitis from ointments and other topical medications can usually designate, when properly questioned, what material has been applied to a particular area It is a good practice to suspect *all* medicaments employed recently and to perform routine patch tests with them

In plant dermatitis, especially from poison ivy, the detection of the cause rarely presents difficulties Most patients are aware of having been exposed to the plant The occurrence of the eruptions after outdoor activities, their acuteness, and their tendency to affect widely separated areas of the body, especially the forearms and feet, suggest their source If *there is need for further investigation, the procedure of Shelmire*[163] can be followed He proposed routine patch tests for a given number of plants which are prevalent locally

2 *Factors Determining A Pattern*

The formation of a pattern is dependent principally upon the degree of the patient's sensitivity and upon the intimacy of contact of the skin with the causative object It is further dependent upon the consistency of the agent, and upon moisture and friction

Intimacy of Contact: A tight rubber girdle or tightly fitting hat band induces a more intense eruption than a loosely fitting one In a dermatitis on the legs from nylon hose, the principal skin area involved was located at the point of pressure where the legs were habitually crossed (Figure 19)

Consistency The consistency of an agent, whether soft, fluid, or semifluid, influences the size and shape of a pattern A solid object does not invade the folds of the body surface, in contrast to a fluid agent Thus,



Figure 16 (*Left*) Soap dermatitis Soap held in left hand when washing clothes Folds and finger webs chiefly involved

Figure 17 (*Center*) From poison ivy Note tendency to linear arrangement of vesicles suggesting contact with a branch of plant (Courtesy Dr Stephan Epstein Marshfield Wis)

Figure 18 (*Right*) From antihistaminic ointment applied to insect bite

in a lesion from a cocobolo wood knife (Figure 15) a characteristic area in the folds of the ulnar portion of the palm remains clear This can be regarded as definite evidence that a solid article has been in contact with the skin On the other hand, a soap dermatitis (Figure 16) can be readily recognized by the tendency to favor skin folds, finger webs, and areas beneath a ring where soap suds tend to settle

Moisture. Moisture has considerable influence on the development of a pattern For instance, dermatitis from a dyed shirt occurs only on sites of excessive perspiration whereas other areas of contact remain free Similarly, lesions from wrist watch straps and spectacle frames appear in many individuals only in hot weather Moisture is considered the principal reason for the fact that areas around the eyes and in the inguinal region are favorite localizations of contact dermatitis

On a farmer, I observed a lesion on the external portion of the thigh This was due to a fertilizer spilled on wet overalls, contact on other parts of the body with the dry material was innocuous The case of a fur dermatitis was brought to my attention This had spread from the neck, through the middle of the chest, down as far as the umbilicus The fur had been drenched by rain, and the dye had leaked downward

Friction: The formation of a pattern is further influenced by friction A fur dye dermatitis was localized exclusively on the lobe of the ear where the stiff hair of the fur rubbed against the skin, the other parts of neck

and face in contact with the fur were only moderately affected (Figure 21) Lesions so frequently encountered on the neck and wrists where the collar and sleeves of coats or suits touch the skin, are largely the result of friction

One of my patients had a dermatitis from an after shaving lotion It appeared only on the lateral portions of the first three fingers which he habitually rubbed against the hair stubbles after shaving In spite of the fact that his face and other parts of the hand also had daily contact with the irritant, they remained free, since no friction was involved

3 *Subsequent Modification of Patterns*

In evaluating a given pattern, allowance should be made for expansion of a dermatitis into surrounding areas of the skin and over the whole body surface Such modification of an original pattern is effected in the



Figure 19 (*Left*) Dermatitis from nylon hose While entire legs were exposed to irritant *the most extensive lesion is found on area of tight contact from crossing legs* (Courtesy Dr S Rothmann University of Chicago)

Figure 20 (*Right*) Very Acute poison ivy dermatitis suggests single contact in extremely sensitive patient Note linear arrangement of bullae. (C[illegible] sity of Chicago)

following manner 1) through extreme sensitivity, 2) through secondary infection, 3) through the development of multiple contact sensitization, 4) through flare-ups of previous lesions, and 5) through combination of a contact dermatitis with atopic eczema

Generalization of Dermatitis. There are certain substances which can affect the whole body surface because they are in contact with every part of the body These are bath salts, dusting powders, soaps, and massage creams On the other hand, any dermatitis confined to a limited area of the body may, if severe enough, become generalized, regardless of where it started or what substance was the original irritant The generalization of the lesion may be so extensive that the areas of primary contact can no longer be discerned For instance, in one of my patients, the instillation of a few drops of ¼ per cent solution of zinc sulfate into the right eye caused a dermatitis involving every part of the skin The patient could tell us that the right eye was the starting point of the eruption and close examination revealed considerably more irritation here than on other parts of the skin



Figure 21 Fur dermatitis involving portions of the ear which are exposed to friction

Moreover, dissemination of a primary lesion occurs when the agent is subsequently applied to multiple sites This is particularly true with dermatitis from nickel, a constituent of most metal articles worn on the body, such as buttons, jewelry, zippers, clasps, rings, etc It also occurs in highly sensitive individuals when patch tests are performed and strongly positive reactions are obtained Generalization of a dermatitis is further aided by flare ups of former lesions localized in other areas Moreover, ingestion or inhalation of the responsible agent (dyes in foods, drugs, insect sprays) may account for generalization of the lesion

Infection *Bacterial:* Secondary infection superimposed upon a dermatitis constitutes another reason for the modification of an original pattern As a rule such an infection can be easily recognized by a characteristic brownish discoloration, by the purulent character of the secretion, and by the transformation of the vesicles into pustules

Fungous. If the sources of the secondary infection are fungi, instead of bacteria, the dermatitis loses its original characteristic appearance. The lesion exhibits features of a fungous infection, appearing scaly, keratinous, or glossy. When these cases are seen by physicians who have not observed

them in their primary state, the wrong diagnosis of a primary fungous disease can be made

"Id" Reaction: In dermatitis with a secondary infection, further difficulties arise from what is considered an allergic response to the infecting agent, generally known as 'id' reaction These lesions resemble a contact dermatitis, being eczematous in character They appear distant from the infected area They do not harbor the exciting organism and, unlike the original lesion, they do not readily respond to antibiotic therapy In fact they are most refractory to any treatment

There are 'id' type reactions (Figure 22) which are believed to occur without the intermediate of an infection, namely from hematogenous extension of some toxic product They may precede the onset of the dermatitis Some have associated these hematogenous "reactions" with erythema multiforme "Id" reactions may alter a pattern considerably

Secondary Contact Sensitization: A pattern of dermatitis often changes its original shape and its general appearance because new contact agents tend to disseminate the original lesion Such multiple sensitivity may have been pre-existing, or it may develop because of an enhanced susceptibility to contact dermatitis in the affected area I have repeatedly observed the development of sensitivity to such topical medications as tar, lanolin, or cottonseed oil, in spite of the fact that these substances have been tolerated on previous applications



Figure 22 "Id" reaction from penicillin Symmetrical lesions on both hands Evidently no direct contact on hands Lesion originated on mouth nose and throat from inhalation of aerosol penicillin

In a patient sensitive to cocaine eye drops, the dermatitis became aggravated when medications, including argyrol and zinc sulfate, which are not related chemically to cocaine, were instilled into the eye These drugs had been used previously on many occasions without ill effect Upon patch testing, they elicited markedly positive reactions Acquired multiple contact sensitivity has been well described and impressively illustrated (Figure 23) by Gaul and Underwood [5]



Figure 23 Drugs and ointments which account for aggravation of dermatitis through development of secondary sensitization (Courtesy, Underwood and Gaul 55)

Secondary sensitization thus accounts, not infrequently, for a change of the patterns of a dermatitis When taking the history on our patients, we must, therefore, obtain a description of the exact outline and appearance of the original pattern before local treatment was employed

Flare up of Previous Lesions· The orginal source or another agent to which the skin is sensitive may produce a flare up of a completely healed lesion, in spite of the fact that the contact is limited to other parts of the skin This phenomenon is termed "reminiscent reaction" Strongly positive patch tests, for instance, applied on back or thigh, can reactivate a dormant lesion elsewhere on the skin



Figure 24 Contact dermatitis of unknown origin in allergic patients recurred at time of menses and when eating tomatoes and chocolate

The tips of the left fingers of an ophthalmologist, with which he habitually retracted the patient's eyelids, had been affected by pantocaine eye drops Through the use of rubber gloves these areas had healed completely However, eight months later the lesions reappeared on the left fingers simultaneously with a marked dermatitis on his left eye He had applied a few drops of pantocaine solution to his own eye Though he had taken the precaution to protect his

fingers completely by rubber gloves, he did not prevent the recurrence on the fingers Whereas the original pattern was still discernible, there was considerably greater involvement of the fingers now than before

Combination with Atopic Factors A pattern of dermatitis may lose its original shape and become larger in size because of ingestion of foods, inhalation of airborne substances, or injections of antigens to which sensitivity exists In an individual allergic to dust, an exacerbation of a dermatitis occurs in fall during the 'housedust season" when the heating system is started, causing dust to circulate throughout the house A contact dermatitis from any source is likely to flare up during the hayfever season in a ragweed sensitive patient Conversely, in several patients sensitive to ragweed, contact dermatitis of the hands of unknown origin cleared up completely when a few pollen injections were given after the hayfever season

A contact dermatitis of the palm of both hands, well controlled otherwise, appeared only upon eating tomatoes and chocolate (Figure 24) In allergic women, contact dermatitis of the hands is often periodically aggravated before the menses This suggests sensitivity to estrogenic substances present in the system at that time [108]

Figure 25 shows a dermatitis on a small area of both hands which has appeared regularly for twelve years, exactly on the day when hayfever patients develop their first symptoms It was easily ascertained that this selected area of the hand had not been in contact with ragweed, because the lesions appeared during a season when the hand was continuously covered with a white glove It, therefore, must have been the inhalation of ragweed, rather than contact, that activated the dermatitis The original lesion was probably caused by contact with a ragweed plant or with some other agent The following year, an aqueous solution of ragweed extract, injected in five doses before the onset of the hayfever season, prevented the appearance of the lesion Leifer [106a] reported a cinnamon dermatitis on the hands from contact with tooth powder flavored with cinnamon oil Flare ups of the lesions occurred after ingestion of cinnamon



Figure 25 Seasonal dermatitis occurring during ragweed season in a patient reacting four plus to ragweed on intradermal testing No hayfever Cause of original lesion not known

4 *Indirect ("Paradoxical") Contacts*

In evaluating a pattern of dermatitis, it should be borne in mind that an area of the body can be the site of the eruption through indirect contact with the causative agent

Through Fingers A typical example is dermatitis from fingernail polish, which is not localized, as one would expect, around the nails to which it has been applied, but on the face, neck, eyelids, and flexor surface of the arms These parts of the body are irritated by the fingers, especially during sleep Similarly, the genitalia and perineal region are subject to dermatitis from nail polish and other cosmetics, and not infrequently, from poison ivy The latter is seen among men who work out of doors, and have no lavatory facilities or do not wash their hands thoroughly before voiding Ephedrine nose drops and eye drops containing nuprocaine are reported to have produced dermatitis in the same manner in the region of the genitalia, the drugs having been transmitted by the fingers at the toilet

Through Contamination from other Areas. I observed a lesion on a girl's right cheek caused by having her face rest in the palm of her right hand during school hours The hand had been contaminated by carrying chrysanthemum flowers to school, yet, the hand itself was free from dermatitis

Dermatitis from hair cosmetics affects eyelids, face, and retro auricular spaces more often than the scalp itself They can produce lesions on the lateral aspect of the elbow when patients sleep with their heads on their arms

Through other Sources. A person who has not been outdoors can, nevertheless, contact poison ivy dermatitis indirectly from a dog who has been roaming among the plants, from garden tools, door knobs, and even from shaking hands with others who have had contact with the plant

Dermatitis from soap occurred on a patient's face from a pillow slip, and in another individual on the buttocks from underwear which had not been rinsed free from soap

An unusual mode of contact is the application of face powders or face creams which are contaminated with traces of fingernail polish Through carelessness, small particles of nail polish chip off the nails and mix with the cream or powder This accounts for the apparent paradox of a face cream causing a nail polish dermatitis In a similar manner deodorants are frequently contaminated with dyes from dresses or leather goods through the fingers

A dry cleaner developed dermatitis from contact with a suit which contained traces of an antiscabetic ointment

VII

Typical Patterns of the Body Surface

THE FOLLOWING presents a classification of typical patterns of contact dermatitis of the body surface The lesions on the hands are described separately in Chapter VIII In perusing the diagrams (Figures 26 28) accompanying this classification, it should be pointed out that their purpose of serving as diagnostic procedure can be attained only if the limitations outlined in the above discussion are borne in mind

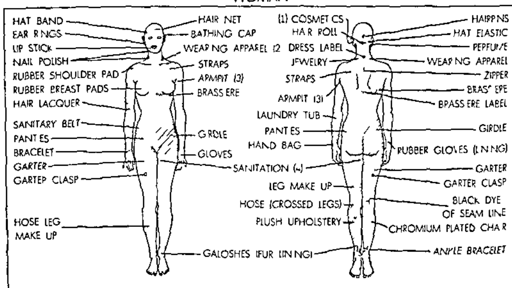
The typical localizations on the body surface are classified into three groups They are those occurring (1) in women, (2) in men, and (3) in both sexes

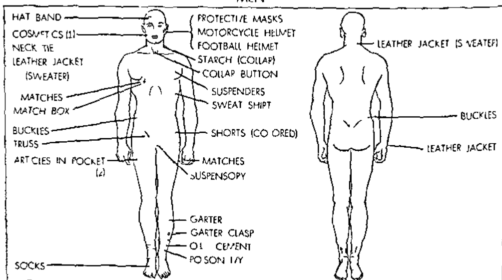
1. Women

Because women use more cosmetics than men, and because their wearing apparel includes a greater diversity of materials, they are more susceptible to dermatitis on the body surface than men Furthermore, a woman's skin is perhaps less 'hardened' than the male skin, which, on the average, is constantly exposed to traumatization In addition, the question arises whether or not the menstrual cycle affects a woman's skin resistance as it sometimes enhances her susceptibility to other allergic manifestations

Forehead The forehead is exposed to contact with all hair cosmetics (Figure 26) and such articles as a hair net, a hatband, and a bathing cap, each one being localized where it touches the head most intimately

In an elderly woman, such an eruption from a hair net (dye, rayon, or human hair) originated on a horizontal line about the middle of the forehead, where the irritation was most intense Through daily use of the hair net, it gradually spread, involving the eyebrows eyelids, and conjunctivae and cornea of both eyes The lesion on the eyes resulted in a keratitis which completely eliminated the patient's vision This condition listed for several months, until it was possible to detect the source The elimination of the hair net was promptly followed by complete recovery and full restoration of the vision





Figures 26 and 27 Diagrams showing typical localizations of contact dermatitis →

A dermatitis from a rubber bathing cap extends around the head in a circular shape Its greatest intensity is on the forehead and below the ears Dermatitis from the dye of a hatband is located near the hair line Other lesions on the forehead can be attributed to curls, stiffened by hair-setting fluid or hair lacquer, which rub *against the skin Lesions from* hair pins and hair curlers occur in this area, as well as in the postauricular folds and the nape of the neck

Cheeks. On the cheeks of a woman, face powder (Figure 29), rouge

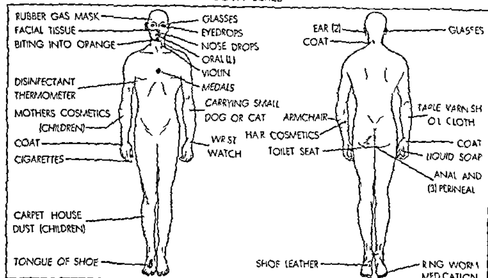


Figure 28

and rubber powder puffs are most important These three items do not involve the eye lids as much as creams (Figure 30), lotions and nail polish which also must be considered in dermatitis of the cheeks (Figure 31) The most common cosmetics of men giving rise to lesions on a woman's cheeks are after shaving lotions and hair tonics Any dermatitis on forehead, ears eyes, and neck may, of course, extend into the cheeks

Neck· Contact with a fur or scarf produces lesions laterally on the neck and below the ears In a fur dermatitis the dyes or chemicals employed in processing furs, as well as insect sprays adhering to furs, are important There may also be sensitivity to the skin from which the fur is made

The site characteristic of a dress dermatitis is somewhat below this area Such lesions result from a dress, as well as from a sweater, blouse, or coat Their cause can be recognized by the fact that there is much more irritation on the sides of the neck where the garment rubs against the skin than in other areas covered by the garment (Figure 32)

The colored label inside of a hatband produces an isolated patch of dermatitis in the nape of the neck In one of my patients a dermatitis from a red dress label was so extensive that it involved a circular area with a diameter of about 25 cm The most irritated point was its center, where the label contacted the skin Through transmission of small particles of the dye from scratching, less pronounced lesions appeared on the antecubital fossae and about the eyes Other lesions from colored labels are seen in the area of the cervical spine from labels of dresses and coats (Figure 33) and between the shoulder blades from the label of a brassiere

Another source of dermatitis in the nape of the neck is black rubber



Fig e 29 (*Upper left*) Dry scaly les on on face from pancake make up

Figure 30 (*Upper rig! t*) From suntan o l Uniform involvement of skin suggests oily material or cream Note Area in front of ear was protected by p tient s hair eyel ds relatively clear (Courtesy Dr Rothmann University of Chicago)

Figure 31 (*Lower left*) Nail pol sh dermatitis Dry circ imscribed scaly from frequent contact

Figure 32 (*Lower center*) Sharply demarcated les on from friction of overcoat on neck complicated by secondary contact sensitization to nail pol sh through scratching

Figure 33 (*Lower right*) Extensive chronic les on from dye of label of overcoat this was aggravated by many secondary contacts and by atop c sensit zation resulting in a general zed dermatit s

hatbands held in place by the hair in the back of the head In the same area, the hat pin may be the cause of nickel dermatitis It is stuck through the hat in order to attach the hat to the hair and touches the skin in the nape of the neck Various dyes and finishing products present in hair rolls (so called "rats") account for a lesion in this area which terminates behind both ears Women who style their hair in an "up-do" develop dermatitis on the neck from lacquered hair pads Anti wrinkle creams are applied by women to the face and especially to the anterior part of the neck The leather or plastic head rest of the beauty parlor chair produces a typical lesion on the nape Some employ an elastic chin strap in conjunction with this procedure Both articles, the anti wrinkle cream and the strap can produce a dermatitis Lesions from face creams do not involve the neck in distinction from a fingernail dermatitis or a dress dermatitis Their border is well delineated on the cheeks and on the forehead

A case of dermatitis on the neck from a plastic apron strap was related to me by Dr Pincus [130] In the back, it showed the well demarcated outline of the strap, which gradually faded in the anterior parts of the neck

Eyes Dermatitis about the eyes is practically always accompanied by more or less pronounced lid edema It may also lead to blepharitis, conjunctivitis, and in rare instances, to keratitis (Figure 34) Lesions on the eyebrows are caused from eyebrow pencil and nickel tweezers used to remove hair, on the eyelashes, from rubber eyelash curlers and mascara Creams tend to settle in the folds of the upper eyelids unless special care is taken to remove them thoroughly after each application In dermatitis about the eyes, nail polish (Figures 35 and 36) hair lacquer, and nail polish remover, as well as all other agents discussed above as causes in other parts of the head, face, and neck, must be given consideration In a dermatitis from a newly dyed dress, the first symptoms are usually itching and edema of the eyes followed by an eruption on eyes and elbows The sensitive soft skin, the presence of moisture, and our habit of rubbing the eyes with fingers contaminated by the causative agent are some of the factors predisposing the eye to contact dermatitis from such a large variety of causes (Figure 37)

Ears Dermatitis may spread from face, mouth, and scalp toward the neck, especially to the spaces behind the ears This is another area where fluid or semi fluid cosmetics, particularly hair lacquers and hair setting fluids (Figure 38), tend to lodge It is also the favorite seat of dermatitis from perfume, which women spray or daub behind the ears Hairpins (nickel and lacquer), celluloid hair clips, and rubber hair curlers produce lesions on this area The lower parts of the ear lobe are subject to dermatitis from earrings containing nickel (Figure 39), plastics, or wooden materials (lacquer) It can also be the seat of dermatitis from fur dyes due



Figure 34 (*Left*) Acute dermatitis from eye drops Greatest intensity on both corners of eyes where drops run down (Courtesy Dr S Rothmann University of Chicago)

Figure 35 (*Right*) Nail polish dermatitis Characteristic localization from rubbing finger nails on eyes

Figure 36 (*Left*) Nail polish dermatitis with secondary fungous infection Positive patch test Lesion did not clear up until fungicidal therapy was instituted

Figure 37 (*Right*) From antihistaminic ointment applied to hands Note uniform involvement of eyelids and surrounding area suggestive of cream or ointment



Figure 38 (*Left*) From wave setting fluid Uniform distribution of lesion on ear and surrounding area

Figure 38A (*Center*) From hair lacquer

Figure 39 (*Right*) Dermatitis in postauricular folds from frame of glasses (nickel) Lesions in this area can also be caused by earrings (Courtesy, Dr Stephan Epstein Marshfield Wis

to friction of the fur on the ear Dermatitis from furs generally affects those parts of the neck which are not covered by the dress

Axillae: In a dermatitis from a dress or rubber dress shield the domes of the armpits are not affected, because there is no close contact of these materials with the skin This distinguishes a dress or dress shield dermatitis from one due to depilatories, deodorants, perfumes and talcum powder (Figure 40) These are applied directly to the dome of the axilla The presence of hair, however, affords some protection in the armpits against these irritants Psoriasis, monilia infections, and sebhorrheic dermatitis, on the other hand, favor the hairy sites These conditions should be considered in differential diagnosis Finger nail polish and polish remover account for dermatitis in the axillary region because of a woman's nervous habit of touching these parts and because of the presence of perspiration

Trunk: The most common causes of dermatitis on the trunk are clothes, their dyes, fabrics, finishing materials, and items attached to them A dress dermatitis involves those parts of the body surface which are not covered by undergarments and hose Here again friction accounts for the development of areas of greater irritation on both sides of the armpits and on the lateral parts of the neck (Figure 41) The characteristic V shaped or semi circular outline of the dress on the neck, and the sharp demarcation of the eruption on the top line of the slip or brassiere further facilitate recognition of this source

A dermatitis due to the lining of a coat can be recognized because it is terminated on the arms by a rather well defined line distal to the dress sleeve When the sleeves are short this line is on the upper arm when they are long it appears just above the wrist A circular area of dermatitis is sometimes seen in women around the middle of the forearm It is due

to the elastic band in fur coats which serves the purpose of attaching the sleeve to the forearm ("storm sleeve"). A dermatitis which involved the flexor surface of both forearms was due to a detergent in contact with these areas when the patient carried her laundry upstairs before doing her ironing. Lesions due to undergarments (panties, girdle, brassiere) assume a pattern suggestive of the outline of each individual piece (Figure 42). A woman in whom a dermatitis was localized where the blouse and the under panties covered the skin had been using a new detergent in her washing machine. This was responsible for this unusual combination in the two separate areas. It should be borne in mind that dermatitis on the trunk can be caused by a



Figure 40 (*Upper left*) From underarm deodorant. In dress shield dermatitis the dome of axilla is clear unless aggravated by medication or infection.

Figure 41 (*Upper right*) Dress dermatitis aggravated by friction with starched collar (Housemaid).

Figure 42 (*Lower left*) From rubber in brassiere. Note outline of its lower border.

Figure 43 (*Lower right*) From stud (nickel) of blouse.

rubber or nylon bathing suit Its pattern coincides closely with the outline of the suit

When dermatitis occurs in circumscribed patches or streaks on the trunk, it is usually due to small articles attached to clothes For instance, where the rubber of shoulder straps or of sanitary belts touches the skin, lesions with characteristic patterns develop In individuals sensitive to nickel, safety pins and studs from blouses and shirts (Figure 43) may be responsible When safety pins are used for the support of sanitary belts, periodic flare ups at the time of menstruation occur Patients are sometimes inclined to attribute this to "nervousness," "menstrual tension," or "glandular disorders" Equally well defined are the lesions caused by the zipper of a dress or girdle, or by a hose supporter containing nickel or rubber Sponge rubber breast pads ("falsies," "gay deceivers") have been encountered as sources of eruptions about the breast Rubber shoulder pads frequently elicit dermatitis on the shoulders

Perineal Areas: The anal, vaginal, and perineal regions are susceptible to lesions from many sources They can often be recognized if we pay close attention to the pattern of the lesions Those caused by sanitary pads for instance, are present on the vulva and the perineum, and are most pronounced when they rub against the inner surfaces of the thigh Cellulose, finishing materials, and deodorants applied to the pad are the irritating substances Soaps, perfumes, and deodorants used by women in the genital area affect chiefly the inguinal folds, depilatories, and hairy parts These lesions may be complicated by secondary fungous infections The labia and vulva are the seat of dermatitis from the hard rubber nozzle of a douche bag, from condoms, pessaries, contraceptive jellies, vaginal suppositories, and from such ingredients of douches as phenol, thymol, etc Dermatitis from douches and other fluid agents involves the inner surfaces of the thighs where the fluid runs down (See Pruritus Ani and Vulvae in Chapter IX)

Legs. Dermatitis due to hosiery, primarily caused by their finishing products and dyes, is limited to the areas covered by the hose This is also the area involved in lesions due to leg make-up Occasionally only a limited part of the leg manifests the eruption, namely the one subject to pressure, perspiration, and friction, as indicated in the case of dermatitis from a nylon hose in Figure 20 A linear shaped dermatitis running down the length of the leg has been reported It was caused by the black dye of the seam line Another rather unusual lesion showed a linear shaped pattern in a woman who used nail polish to stop a run in her hose Patchy eruptions on the frontal and lateral aspect of the thigh originating from garter clasps (nickel) are relatively common (Figure 44) Band shaped lesions occur from rubber in garters

On the lower legs I have noted dermatitis from galoshes localized about the calves It occurs mostly in winter and is aggravated in rainy weather when the black dye of the fabric or the fur trimming becomes soaked The pattern of lesions from rubber boot shaped overshoes is localized above the shoe line where their contact with the leg is tightest (Figure 45) In the summertime, when women wear no hose, an intriguing pattern is observed on those parts of the calves which habitually touch a leather chair, or a chromium plated part of a piece of furniture, such as a theater seat or soda fountain chair In women with the habit of folding their bare legs under them on a leather settee, lesions occur on the lateral part of one leg or thigh On a woman's foot I observed a very extensive circular dermatitis from nickel present in an anklet Through perspiration there was considerable extension of the original eruption into the lateral portions of the foot Nickel dermatitis is also encountered on the dorsum of the foot from metal trimmings on shoes Dermatitis from soap splashed from a washing machine on a woman's ankle has been described

2 *Men*

Most contact lesions in a man can be associated with his occupation They involve the exposed parts of the body, especially the face and hands

Head: As to man's face in our search we must consider any powdered, oily, or greasy materials They are either transmitted from the hands to the face, as for instance oils, soaps, and paints, or they reach the face because they are airborne being either volatile (linseed oil, Figure 46) or solid particles carried by wind, such as insect sprays, wood dust, or pollen present in the air Among cosmetics, shaving creams and after shaving lotions, creams, styptics, and electric razors produce lesions where they are applied Lesions from shaving creams and after-shaving lotions are nearly always accompanied by an eruption on the hands because of friction with the newly-shaven beard Another characteristic feature of dermatitis from after shaving lotion is the involvement of the forehead because men often "finish up' the application to the beard with a stroke of the palm over the forehead All cosmetics applied to the female face and head may induce dermatitis in man Individuals with a mustache employ such cosmetics as pomade to stiffen it and creams containing black dyes They produce typical eruptions at the site of the mustache

On a man's forehead one of the most common lesions is a hatband dermatitis caused by leather dye (Figure 47) This is a well delineated eruption of band shape, one to two inches wide, with greatest intensity on the lateral parts of the forehead I observed a dermatitis in a young cadet on both cheeks and forehead, occurring in late fall of three successive



Figure 44 (*Left*) Patchy lesions on thigh from garter clasps (nickel)

Figure 44A (*Center*) Enlargement of one of the lesions

Figure 45 (*Right*) From lining of boots (Courtesy Dr Stephan Epstein Marshfield Wis)

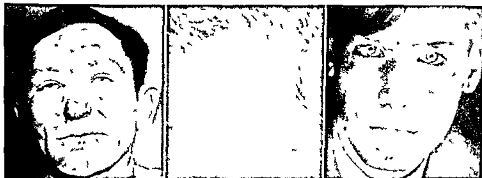


Figure 46 (*Left*) Linseed oil dermatitis involving hands and face (painter) Note top of forehead free protected by cap Marked irritation around nose and nervous habit of rubbing it

Figure 47 (*Center*) Hatband dermatitis This is sometimes mistaken for seborrheic dermatitis (Courtesy Dr Stephan Epstein Marshfield Wis)

Figure 48 (*Right*) Extensive involvement of face from strap of football helmet present during three successive seasons

years It was due to a leather football helmet (Figure 48) Motorcycle helmets, aviator headgear, and certain protective masks used in industry to guard against inhalation of dusts and fumes produce dermatitis on a man's face and head

In the region of the larynx a small circular patch of dermatitis originates from the nickel or celluloid present in a collar button In about the same area a more extensive lesion is caused from the dye of a necktie when patients perspire A starched collar can account for a contact dermatitis on the neck The leather chin strap or the black or brown chin band of a boy's cowboy hat can cause a dermatitis which is most marked on both sides of the chin

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due to the metal buckles of shorts was related to me by Rothman [43] Fabrics and dyes of trousers affect the legs in an area extending from the lower edge of the underwear to the ankles The lower border of this zone usually coincides with the sock line Dry cleaning fluids applied to trousers involve the same area the fumes are said to occasionally cause irritation on the face *The lateral aspect of the lower leg and of the dorsum of the* foot are the seat of dermatitis from oil or gasoline dripping into this region Cement sawdust and other occupational contact agents soiling these parts of the pants should also be regarded as other possible sources

On the lower leg dermatitis circles the leg when it results from the elastic of a man s socks or garters it is patchy when caused by the garter clasp (nickel) One of the most common causes of dermatitis on the lateral portions of the lower leg is poison ivy Lesions induced by direct contact from walking through the ivy patches can be distinguished from those caused by poison ivy material adhering to the inside of the trousers The former are more acute because of a single exposure they show a linear distribution of the vesicles (Figure 12) If poison ivy sap adheres to the trousers there is usually prolonged and repeated contamination of this area This results in a more chronic and more homogenous appearance of the lesion

3 Both Sexes

Many articles liable to cause dermatitis are in use by both man and woman

Head Lesions from spectacle frames due to nickel plastic or tortoise shells (dye pyroxylin) extend from the bridge of the nose about the lower border of the eyes toward the ears They are most intense at the post auricular folds on the head I encountered identical lesions from finger nail polish applied to spectacle frames of sun glasses In individuals exposed to insect sprays (pyrethrum DDT) garden sprays (arsenic) chemical dusts fumes and volatile oils the whole surface of the face is uniformly affected These cases should always be investigated from the point of view

from cotton
In a similar

manner a mother s facial and hair cosmetics and according to Simon [167] her own dandruff can give rise to contact lesions on a child s cheeks and mouth

Eyes Practically any constituent of eye drops can be the source of lesions about the eyes They tend to spread downward in a more or less vertical streak from the corners of the eyes where the drops run down

Trunk: Linear lesions from rubber and especially plastic suspenders occur on a man's shoulders The fabric and dye of an overcoat and its lining are favorite causes of dermatitis on the base of the thumb, the wrist, and the lateral parts of the neck The chest, especially the lower and lateral portions, is the favorite site of dermatitis from sweat shirts This condition is sometimes wrongly attributed to industrial causes because it appears or is aggravated at work In summer when thin trousers are worn, the belt line may show a dermatitis from the dye of a belt The severity of this lesion depends largely upon how much the patient perspires Some trousers are made with an elastic lining on the inside which serves as a substitute for the belt Since this has become fashionable, dermatitis from rubber on the belt line has been observed

In a bridegroom a very acute lesion was encountered involving practically the entire half of the ventral portion of the trunk with the most intense irritation on the arms and the adjoining parts of the chest He was forced to cut his honeymoon short because of this disability It was traced to an expensive perfume, containing oil of Bergamot, which his bride had applied to her neck and other parts of her body

In the inguinal areas, dermatitis is encountered from the leather dye of a truss, in the scrotal and pubic region, from the rubber, dye, or fabric of a suspensory The penis and anterior parts of the scrotum are subject to the same irritants as the corresponding areas in woman Dermatitis from poison ivy on the genital region is discussed elsewhere (page 127)

Legs A very characteristic site of dermatitis is the lateral portion of the thighs where the pants pockets touch the skin A large variety of items carried in the pocket may be responsible for this lesion, *e g*, coins, keys, tobacco, matches, match boxes, cigarette lighters, lighter fluid, golf tees, and leather pocket books This condition is more frequent in summer when no underwear is worn and when perspiration on the leg soaks through the lining of the pocket and thus dissolves the chemicals present in these objects Match dermatitis favors this area as well as a site on the chest where the shirt pocket containing loose matches touches the skin These lesions are sometimes seen in combination with dermatitis on the tips of two fingers in those who have a habit of lighting matches with the finger nails

A leather pocketbook carried in a man's hip pocket can produce a dermatitis on a circumscribed area on the thigh Lesions on the hips can also be produced by dyes and fabrics of shorts and bathing trunks Their outline corresponds to that of the respective garment The eruption is most marked at the belt line where the garment is in close contact with the skin It is also prominent on the thighs where friction with the lower border of the shorts occurs, especially upon walking A very intense lesion



Figure 54 (*Left*) Rubber cups (aviator) Circular outline suggests causative object (Courtesy, Dr J B Howell Dallas Texas)

Figure 55 (*Center*) From dye of ear muffs

Figure 56 (*Right*) Lesions on lower part of ear characteristic of atopic eczema

diagnosis (Figure 51) Contact dermatitis on the eyelids from ragweed pollen is more patchy (Figure 52) and is accompanied by other lesions on

[illegible]

other because of the patient's [illegible]

a patient with a dermatitis on the ears and about the chin from [illegible] of a blanket with which he habitually covered his face at night Plastic of telephone receivers (Figure 53) and earphones (Figure 54) ear cups, and dyed woolen or fur ear flaps (Figure 55) produce a fairly clear impression of the respective object on and around the ear Dermatitis inside the earlobe originates from hearing aids and the plastic or rubber end pieces of a stethoscope or other hearing devices The lacquer of a hairpin caused a similar lesion in a patient with the nervous habit of picking her ears with a hairpin Above the earlobe lead pencils can cause a lesion with a charac- [illegible] fold formed by the lower end of the [illegible] (Fig-

ure 56) It may or may not [illegible]

The most common source of itchy eruptions inside of the [illegible] fungous infections Contact sensitizations to drugs used to combat them often accounts for their aggravation and extension to the outer portions of the ear

Nose and Mouth. The areas next to the nostrils are susceptible to lesions from perfumed or dyed handkerchiefs, and from facial tissues. A large number of drugs present in nose drops (Figure 57), notab ephedrine compounds, merthiolate, turpentine, and menthol are habl produce contact dermatitis on the upper lip below the nostrils

(Figure 49) Should the medication be applied while the face is wet, the lesion is liable to spread over the whole face (Figure 34) In this case, one can determine that the lesion originated from eye drops It is more intense about the eyes where the solution had first been applied it is less severe on the face where the moisture diluted the eye drops In chronic lesions (Figure 50) the surrounding areas are usually irritated by ointments and other medications This eliminates the chances of recognizing the original source from the appearance of the lesion Cleaning fluids for eye glasses have been named as sources of dermatitis on the eyelids

Careful inspection of the eruption on the eyes assist in identifying other sources Creams or oily substances, for instance accumulate in the folds of the upper lids If the lesions are limited to the margins of the lids an atopic blepharitis from food and inhalants should be considered in differential

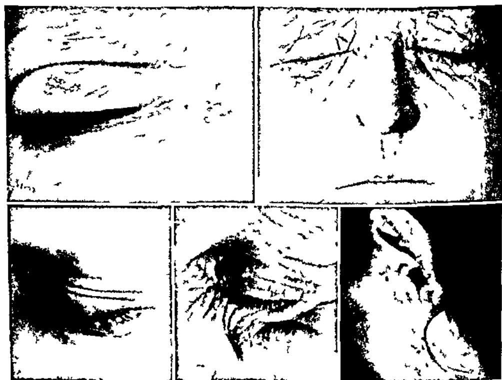
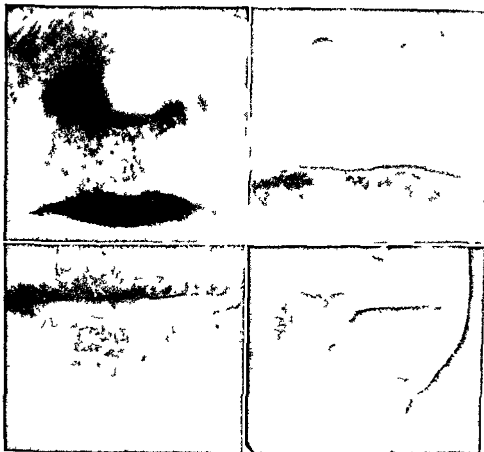


Figure 49 (*Upper left*) From eye drops Note Marked irritation on lateral corner
Figure 50 (*Upper right*) Chronic dermatitis from Butyn eye drops (Courtesy Dr S Rothmann University of Chicago)

Figure 51 (*Lower left*) Atopic eczema blepharitis aggravated by eye drops

Figure 52 (*Lower center*) Ragweed dermatitis seasonal patch test positive

Figure 53 (*Lower right*) From telephone receiver in patient with atopic eczema affecting helix and part of cheek



F gure 57 (*Upper left*) From nose d ops conta n ng ephedr ne and n ethyl sal ylate (Co r te y Dr Stepl an Epste n Marsl field W s)

F gure 58 (*Up er r gl t*) From chap st ck apj l ed as p ote t on aga nst sunburn on f h ng tnp

F gure 59 (*Lower left*) From ammon ated tooth powder n astl mat c pat ent d s nbut on s m lar to l pst ck lermat t s

F gure 60 (*Lower r gl t*) Fron cu l ll ng sm ll dog to face Cau t e ag nt deodorant appl ed to dog

holstered armchair (flat surface type) This condition is seen in patients after they have been in a theater where they had contact with the armrest of the theater seat

The habit of resting the head on the radial surface of the elbow during sleep causes lesions on this part of the arm from hair cosmetics On arms and legs we encounter a dermatitis from jelly applied to the electrodes when an electrocard ogram is aken or diathermy treatment administered A characteristic contact in children is often associated with atopic eczema

A perfect circle about the mouth is described by Vaughan and Black[196] as the localization of a dermatitis from a plastic dictaphone mouth piece. The seeds of apples, oranges and grapefruits, and of such other oil containing foods as celery, nuts, and coconuts account for dermatitis on both lips. Other agents responsible for this eruption are dyes present in such foodstuffs as colored cake frosting or colored candy and such drugs as salicylates, quinine, phenolphthalein, sulfa drugs, etc. I observed an unusually severe dermatitis confined to both lips which was caused by a chap stick containing menthol and a local anesthetic (Figure 58). Lipstick should always be considered as a source of such lesions in women and men as well, in the latter it is due to secondary contact with a woman's lips. Ingredients of dentifrices, mouth washes, chewing gum, adhesive powders for dentures, and the synthetic materials from which dentures are made, affect the skin of both lips in conjunction with more or less extensive involvement of the mucous membranes of the mouth (Figure 59). The lesion from bubble gum involves a larger area on the chin and above the upper lip.

Cigarette holders, cigarettes, and pipes, and occasionally wooden handles of knives held between the lips, affect the mouth as well as the fingers which touch them. Dry keratotic lesions appear on the lips from the mouth pieces of musical instruments. Some consider them as a form of contact dermatitis, others, as occupational marks from continuous pressure on the skin. The chromium or nickel present in a dentist's drill has been noted as the cause of an isolated patchy contact lesion on a patient's lip.

I observed an unusual eruption of the shape of a semicircle, located on the chin of a young man. When eating oranges he had the habit of first biting into the orange in order to peel it. He gave a strongly positive patch test to the oil of the orange rind. In the rind of a citrus fruit, another culprit may be the dye with which the fruit is colored before shipping in order to give it a more natural appearance. An acute dermatitis on the right cheek involving the neck associated with an eruption on the radial portion of the right arm was due to a fly spray applied to a dog. The patient had been holding the dog in her arms and cuddling it on her cheeks (Figure 60). Rostenberg [*] reported a similar case due to doghair which was also limited to one side.

Arms. A typical localization from which a diagnosis can readily be made is the one resulting from resting the arms on a table. It is found on the flexor and ulnar aspect of the forearm from contact with an oilcoth table cover or with various kinds of wood and varnish. Other lesions which can easily be identified are noted on the ulnar surface of wrist, hand, and forearm from varnish, leather, mohair, or other coverings of an up-

[*] Personal communication

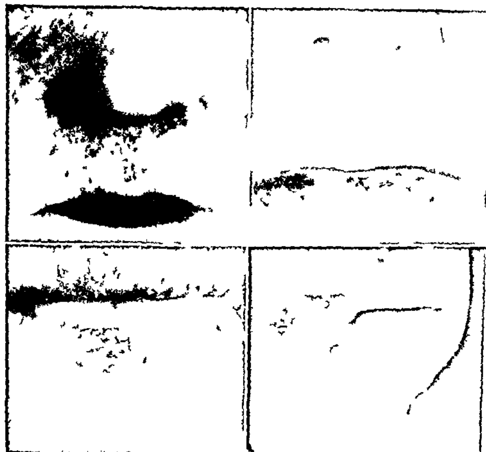


Figure 57 (*Upper left*) From nose drops conta n ng epl edrine a d n ethyl sal cylate (Co r tesy Dr Stephan Epste n Marshfield W s

Figure 58 (*Upper r gl t*) From ch p st k appl ed as protect n aga n t s nburn on fi l ng tr p

Figure 59 (*Lower left*) Fro ammon ated tootl po der in asthn atic pat ent d tr but on sim lar to l pst ck dern at t s

Figure 60 (*Lower rigl t*) Fro n cuddl ng small dog to f ce Ca s tive agent deodorant appl e l to dog

holstered armchair (flat surface type) This condition is seen in patients after they have been in a theater where they had contact with the armrest of the theater seat

The habit of resting the head on the radial surface of the elbow during sleep causes lesions on this part of the arm from hair cosmetics On arms and legs we encounter a dermatitis from jelly applied to the electrodes when an electrocardiogram is taken or diathermy treatment administered A characteristic contact in children is often associated with atopic eczema





Figure 61 (*Left*) Typical toilet seat dermatitis (varnish disinfectant plastic) (Courtesy Dr S Rothmann University of Chicago)

Figure 62 (*Right*) Shoe leather dermatitis note exact outline of boot (Courtesy Dr S Rothmann University of Chicago)



Figure 63 Dermatitis from arch supporter

It is localized on the flexor surfaces of a child's arms It is due to the cosmetics which the mother is wearing when the child embraces her

Trunk The outline of a bathing suit is significant because a lesion on an area covered by it may be due to dyes and fabrics On the other hand if the area covered by the bathing suit is free from dermatitis we may infer that suntan oil applied to the exposed surface is the culprit On the chest and on the back we observed a patchy lesion due to nickel from religious medals A hot water bottle may account for a rubber dermatitis on back or abdomen The dye on laundry marks can be responsible for small lesions of dermatitis on various parts of the trunk In children with atopic eczema nickel dermatitis occurs on both hips from the safety pins of diapers

In the axillae the disinfectant used on the thermometer has been found to be responsible for a contact lesion Dermatitis from toilet seats (Figure 61) is due to either varnish paint celluloid plastics or occasionally to disinfectants (Lysol) One of my patients with a typical design of a toilet seat dermatitis showed a marked aggravation on one buttock while the other was much less involved This was due to his habit of leaning to

one side when sitting on the toilet. Lesions similar to toilet seat dermatitis are due to leather seats. They usually occur in the summer when patients perspire. Truck drivers may manifest these lesions.

Legs: In infants and young children, rubber panties induce a dermatitis where they are in contact with the skin. The largest portion of the buttocks is protected from contact with rubber by the diapers.* Among bedridden individuals the legs and hips may manifest a dermatitis from a rubber pad, particularly on their lateral aspect. Housedust, floor varnish, and the fabric or dye of carpeting occasionally produce a dermatitis on the legs of children who play on the floor. Lesions due to a rubber bandage or rubber knee covers encircle the parts of the legs to which they are applied. Gauze bandages soaked in a disinfectant to which the patient is sensitive cause well demarcated circular lesions at the respective areas. Shoe leather dermatitis (Figures 45, 62, 63), by far the most important affection on the feet, is common to men and women. It is dealt with on page 139. Cornplasters and protectors for bunions should be considered as causes of dermatitis on feet and toes.



Figure 64. Generalized dermatitis from plastic powder dust in factory.

Perianal Region. Since plant oils, especially those of poison ivy, have been used orally for treatment of plant dermatitis, *pruritus ani* has been observed from elimination of the ingested oil with the feces. The oil of walnut has been demonstrated by patch test as a source of contact dermatitis in the anal region. Control tests with oils from other nuts produced no ill effects. There are probably many other food residues, especially fatty acids, which should be considered as sources of pruritus. In recent years, antibiotics orally administered have

*"Diaper dermatitis," "napkin erythema" or "diaper rash" are caused by bacterium ammoniagenous which originates in feces and grows in articles soiled by urine. This organism is aerobic, gram positive, non motile, rod shaped, with rounded ends. It measures 0.8 x 1.6 microns. Its growth is inhibited by an alkaline medium and accelerated if the intestinal contents are of low acidity. When it is in contact with urine it splits up urea and liberates ammonia which causes a dermatitis. Diaparene chloride ointment, a quaternary ammonium compound is considered a specific bactericide for this organism and effective in clearing up the rash.

been reported to cause pruritus ani This is probably a true contact sensitivity In lesions in the perianal regions, toilet paper, especially when colored, all types of cathartics, suppositories containing cocoa butter, and the hard rubber nozzles of enema bags have been demonstrated as causative agents Ointments applied to the anus in patients suffering from hemorrhoids and other rectal disorders are other common sources of dermatitis

In differential diagnosis allergic reactions to parasites localized about the anus should be considered The moisture which is almost constantly present in these areas forms a soil favorable to the development of certain fungi Fungous infections are much more extensive than irritations from parasites They appear on the adjoining surfaces in the crotch of the buttocks and spread to the area of the lower spine as well as to the inguinal region where scrotum or vagina become affected The lesions are usually well delineated and show a tendency to healing in the center In some cases fungous infections are superimposed on a primary contact dermatitis which soon loses its morphological characteristics

Generalized Lesions. When the whole body surface is affected by dermatitis, we usually encounter extreme sensitivity which accounts for extension of a localized lesion regardless of the nature of the primary agent Articles which have contact with the entire body such as body powders, ingredients of baths (salts, oils) and perfumes may also be responsible Furthermore, ingested or injected medications should be considered, as well as industrial products such as oils or chemical dusts (Figure 64) The areas where perspiration is present manifest more extensive lesions

A summary of the causes in relation to their localization is presented in Table VI

TABLE VI

SUMMARY OF CAUSATIVE AGENTS

Localization *	*Suggested Causes*	
HEAD		
Face	Cosmetics	
	Shaving cream	Shampoo
	Hair dye	Soap
	Astringent lotion	*Scalp lotion*
	Bleaches	Hair tonic
	Beauty mask	Acne creams
	Vanishing cream	Depilatories
	Hair lacquer	Freckle remover
	Hair lacquer pads	Suntan oil
	Cold wave material	Olive oil
	Dandruff remover	Powders
	Powder, Rouge, Perfume	Rubber powder puffs
	Others	
	Industrial gas mask	Bathing cap
	Motorcycle helmet	Shower cap
	Hatband	Electric razor
	Hair net	Insect sprays
	Plant pollens	Pillows
	Gasoline	Football helmet strap
	Cleaning fluid	
Eyelids	Eyelash curler	Gaseous substances
	Eyebrow pencil	Nasal sprays
	Eye drops	Cleaning fluids
	Eye washes	Anti moth preparations
	Eye shadow	Face cosmetics
	Cleaning fluid for glasses	Dress dyes
Lobes of Ears Retroauricular Area	Perfumes	Goggles
	Earrings	Ear muffs
	Furs	Pencil behind ear
	Hearing aids	Ear drops
	Spectacle frame	Stethoscope
	Ear phone	Telephone receiver
Lips and Perioral Area, Nose and Naso labial Areas	Lipstick	Blanket
	Chapstick	Adhesive powder of dentrifices
	Nail polish	Seeds of apples, oranges etc
	Nail polish remover	Cigarette holder
	Dentrifices	Musical instrument (mouth piece)
	Dental drills	Nosedrops
	Chewing gum	Drugs
	Mouth wash	Handkerchief perfumed
	Dyes in foodstuffs	Pipe
	Paper tissues	Vegetables celery, tomatoes, spinach, etc
	Nasal ointment	
	Dentures	
	Tooth powder	
	Inhalators	
NECK	Starched collars	Scarves
	Neckties	Jewelry
	Coat	Anti wrinkle creams
	Violin chin rest	Perfumes
	Hair net	Hair pins
	Hair dye	Hair lacquer
	Cold wave materials	Hair lacquer pads
	Dandruff remover	Shampoo
	Soap	Scalp lotion

TABLE VI—*Continued*

SUMMARY OF CAUSATIVE AGENTS

Localization	*Suggested Causes*	
Axillae and Periaxillary Area	Depilatory Disinfectant of thermometer Perfumes Dyed materials	Deodorant Dress shield Shaving materials DDT
Upper Arms and Forearms	Watch band Jewelry Oil cloth Armchair Table covering Rubber doll Laundry tub *Dyes—dresses coats*	Soaps and detergents Furniture lacquer Hair cosmetics when sleeping Theater seat arm rest Contact with mother's hair cosmetics in children
Trunk	Dry cleaning fluid Sweat shirt Brassiere Massage creams Bath salts Powders Suntan lotion *Shoulder pads*	Laundry marks Underwear Night clothes Label (brassiere, blouse, coat) Sweaters Depilatory *Hot water bottle*
Chest	Scapular medals Starch in collar Dry cleaning fluid Brassiere label Match box	Collar button Jewelry Breast pads Matches
Thighs, Perianal, Vulvar, Perivulvar, Penis, and *Scrotum*	Shorts Contraceptives *Money belt* Sanitary belt Toilet seat leather seat Toilet tissue Suspenders Lining of pocket Garter clasp Douches Substances transmitted by *hands* Poison ivy Perfumes Condoms Articles in the pocket Matches Cigarette lighter Tobacco Key case	Bathing trunks Leather belt *Rubber belt inside of pants* Panties Girdle Diapers Substances in enemas Garters Suppositories Anticonceptive jellies Pessaries *Vaginal suppositories* Deodorants Disinfectant of thermometer Match box Coins and other metallic objects Wallet
Legs	Trousers Socks poison ivy, plants Nail polish to stop run in hose Depilatory Plush leather upholstery Shoe, slipper Arch supports *Tongue of shoe*	Oil in trousers Laundry marks Nylon hose, socks Leg makeup Theater seat Galoshes (fur lining) Shoe polish Lining of shoe *Soap splashed (washing machine)*

VIII

Patterns on Hands

The largest number of dermatitis lesions are found on the hands This is due to the fact that they have contact with a greater variety of objects than any other part of the body It is therefore much more difficult to establish a causative diagnosis and to present a workable all inclusive classification for lesions on the hand

There are limitations to all classifications which might be offered In the one presented by Waldbott and Shea [197] the objects involved in the contact form the basis for differentiating the various patterns Allowance had to be made for the fact that there are occasionally several modes of gripping an object For instance a vertical bar type is distinguished from a horizontal one the grip on a large ball differs from that on a small ball Some patterns present transitional phases of two different types This does not necessarily contribute to confusion it does however require that the basic patterns receive proper recognition

In classifying dermatitis on the hands an observation was made which may be of considerable practical importance to the clinician namely the recognition that some patterns are diagnostic for certain actions For instance the common denominator of a large number of lesions on the dorsum of the hands is the action of reaching into something the so called central palm lesions suggest contact with the end of a bar (see page 95)

Factors Determining a Pattern on the Hands

A pattern of dermatitis on the hands is determined principally by the shape and size of the causative object (This differs somewhat from patterns on other surfaces where friction moisture and intimacy of contact with the object are the major determinants in the development of a pattern) There is a characteristic manner in which an object such as a rubber ball a plastic bar a nickel plated radio knob is grasped How the size of an object changes a given pattern is illustrated in Figures 65 and 66 The larger the object the larger is the area of the skin involved Tightness of grip friction moisture shape of the hand and frequency of exposure are of

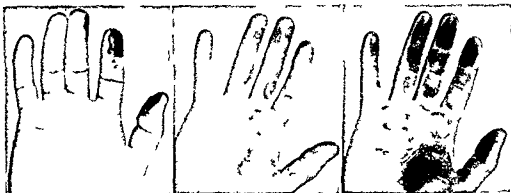




Figure 65 A pattern is determined by the size of object Note transition from finger grip to large ball type a (*Upper left*) Radio knob b (*Upper center*) Orange c (*Upper right*) Grapefruit d (*Lower*) Large ball



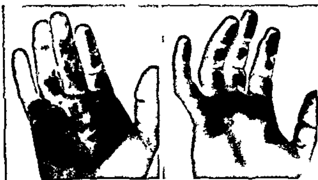


Figure 66 Transition from small horizontal bar type to large horizontal bar type a (*Upper left*) Handbag strap (very thin "bar") b (*Upper center*) Thin horizontal bar (*e g* dog leash) c (*Upper right*) Thicker horizontal bar (*e g* athlete's bar) d (*Lower left*) Hat brim e (*Lower right*) Starfish (transition to large ball type Figure 65D)

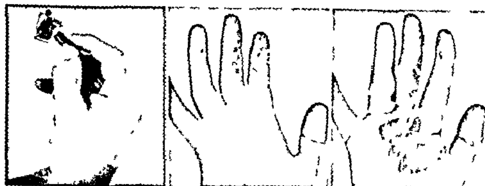


Figure 67 Pattern influenced by tightness of grip a Plastic razor b Gentle grip c Tight grip

secondary importance in influencing the formation of a pattern The effect of the grip is illustrated on a plastic handle of a razor (Figure 67), if held gently, only three fingers are affected, from a tight grip an additional area in the distal part of the palm becomes involved Friction and traumatization of the skin influence the development of the pattern in milker s dermatitis (Figure 68) The lesion occurs not on the parts of the hands doing the milking, but on the dorso radial area which rubs against the cow s hair A certain motion, such as turning a radio dial, produces a pattern slightly different from that caused by gripping it On a plump hand with stubby fingers, the pattern from a particular object will appear slightly different from that on an elongated, bony hand

As in other areas of the skin, repeated exposure induces greater induration and keratinization of the lesions (Figure 69) Dermatitis from fluid and semi-fluid agents is less circumscribed and tends to spread beyond the site of the primary contact, whereas more clearly demarcated lesions are produced by dry objects (metals, woods, plastics, etc) Such chemical irritants as iodine or gasoline aggravate the degree of inflammation (Figure 8) In evaluating a pattern, some simple, rather obvious facts stand out

1 The larger an object, the larger the areas of the hand that are affected A lesion localized near the finger tips must be due to an object of small size This is illustrated by comparing the pattern from gripping a foot ball with that from gripping a lacquered hair pin

2 If a lesion is localized in the folds of the hands and involves the web spaces between the fingers, it indicates that its source is a fluid or semi fluid agent If, on the other hand, these areas are free, a solid substance must be considered

3 Some articles consist of different materials The finger grip pattern, which one would expect from gripping a lead pencil, is modified if a patient is sensitive only to the cedarwood portion, not to the painted part A child's



Figure 68 (*Left*). From milking cow: lesion largely localized on areas of friction with co s l r

Figure 69 (*Right*). Dermatitis (shoe salesman) from handling shoes (leather dye) and shoe boxes (large ball type).

play pistol may produce a nickel dermatitis only where the fingers touch the metal part while the palm remains unaffected where the plastic handle is gripped by the hand. In a glove dermatitis in a child the leather cuff alone may produce a lesion. In another case the cotton inlay of a rubber glove modifies considerably the customary design of a glove dermatitis.

4. Lesions affecting the whole hand which at first glance do not reveal a clear pattern actually show areas of greater intensity if they are examined carefully. These may betray their origin.

Subsequent Modifications of Patterns

As in dermatitis elsewhere, the pattern on the hand is subject to subsequent modifications by secondary contact sensitivity, especially from drugs and ointments, by secondary infection, and by atopic sensitization. For some reason a contact dermatitis on the hand seems to be more susceptible than lesions elsewhere to aggravation from inhaled airborne substances, ingested foods or drugs, and from hypodermic injections of antigens to which sensitivity exists. Conversely, judging from my own observations, dermatitis on the hand improves more readily from treatment of the atopic factor, i.e., elimination diets and hyposensitization, if the patient manifests evidence of simultaneous atopic sensitivity.

Classification

The patterns on the hands are classified under the following headings 1) Lesions occurring on fingers only, 2) on fingers and palm 3) on the finger webs, 4) on wrist, 5) on the dorsal surface of the hand, and 6) on the entire hand

1. Fingers Only *Finger Tip Type* (Figure 1P 8P) Dermatitis on the volar surface of individual fingers originates from frequently touching certain articles such as a plastic or metal button on a starter of a car a radio push button, the metal part of a buzzer, and a certain kind of light switch A young woman had a lesion on the tips of thumb and middle finger (Figure 70) from habitually locking her wrist watch clasp which was grasped between the two fingers A grocery clerk had a dermatitis on the tips of both index fingers (Figure 71) from frequently turning a numbering stamp Friction from the sharp edge of the turning dial played a part in its development A typical dermatitis near the nails of thumb and third finger on the left hand occurs from habitually lighting matches with the



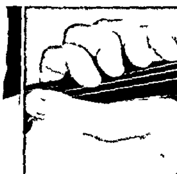




Figure 1 Figure 2 Figure 3

Scratching Violin Strings Eye Ointment

Figure 1A Figure 2A Figure 3A









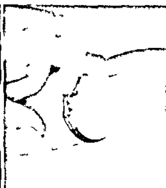


Figure 4 Figure 5

Push Button Opening Wrist Watch Clasp

Figure 4A Figure 5A



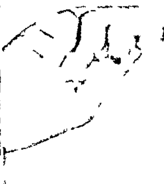






Figure 70 (*Left*) Middle finger Opening watch clasp (nickel) This design also observed in woman with habit of pushing hairpins into hair with middle finger

Figure 71 (*Right*) Stamp indicator Grocery clerk using index fingers on both hands daily to change date on stamp indicator Patch test for nickel three plus Dermatitis localized in area of traumatization

fingernails Women with the habit of pushing hairpins back into the hair[10] manifest lesions from hairpin lacquer on the tips of one or more fingers

If several fingers are involved, musical instruments should be considered, namely, the wood and metal keys of woodwinds, the metal of certain brass instruments, the strings of violins (Figure 72) or occasionally the rosin which adheres to the strings Creams and liquids should be suspected when lesions are localized beneath and around the nails This is the case in dermatitis from massaging cosmetics into the scalp or from the nervous habit of constantly scratching the hair to which cosmetics have been applied (Figure 73) Through contamination of the finger tips with eye drops or eye ointments when pulling down the eyelid, a drug dermatitis can be brought about on the finger tips This is usually associated with lesions on the eyes I have encountered dermatitis on the four finger tips and the lateral part of the thumb from polish which had been applied to piano keys (Figure 74) An identical pattern was observed by Shea[161] in a typist whose typewriter was continually exposed to oil spray Her desk was located at an open window near an airplane take-off In most lesions in this group the action of touching the object, as differentiated from gripping it, is significant

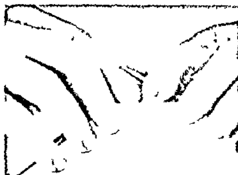


Figure 6

Knitting

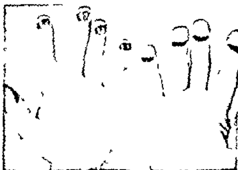


Figure 64

Finger Grip Type (Figures 9P-17P) Gripping an object with the fingers requires the combined use of the distal portions of thumb, index, and middle fingers The resulting pattern (Figure 10P) arises from frequently gripping such articles as the knobs on furniture office equipment, kitchen cupboards, metal or plastic buttons, small pieces of jewelry, or a lipstick container Pills and tablets, and such food as popcorn peanuts, or olives are picked up in the "finger grip" manner Several cases from rubber medicine droppers and another from a knob on a bottle brush[109] held by the three fingers were brought to my attention Habitually

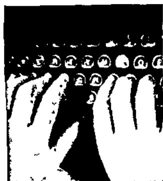




Figure 7 Figure 8 Figure 9

Typewriting Stamp Indicator Toothpaste Cap

Figure 7A Figure 8A Figure 9A

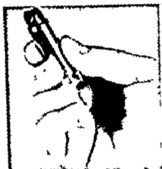







Figure 72 (*Left*) From violin strings Positive patch test to rosin

Figure 73 (*Right*) Habitually scratching scalp (hair tonic)


Figure 10

Lipstick Container


Figure 11

Key


Figure 12

Medicine Dropper

Figures 10A and 11A

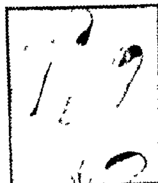
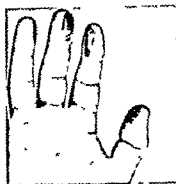


Figure 12A



pulling a chain or cord produces a dermatitis of a similar pattern More extensive lesions affecting the three fingers and the lateral aspect of the ring finger appear from frequent handling of larger objects, such as a bunch of keys We observed a patient with this lesion who had the habit of handling the coins in his pocket The pattern encountered in dermatitis from tulip bulbs is very similar

Smaller Objects The smaller the object (lacquered hairpins rubber hair curlers, pins used by a tailor), the smaller the areas involved It is true that lesions due to such small objects are localized at the distal part of the fingers However, they are distinguishable from those of the finger tip type because the grip pattern present on the first three fingers is very characteristic Plastic and metal knitting needles, crochet hooks, and the colored paper on florist's wires are other sources responsible for this pattern *

Finger Turn Design The "finger turn" design is a modification of the

* Florist's wires are also covered with resins to give them the proper luster

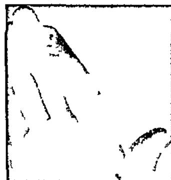




Figure 13 — Figure 14 — Figure 15

Fingering Hair — Zipper — Polishing Shoes

Figure 13A — Figure 14A — Figure 15A





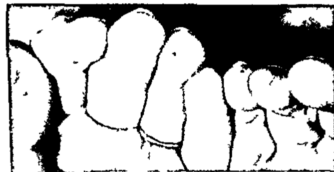
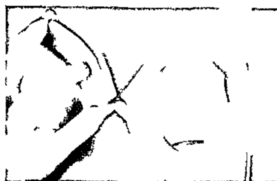



Figure 74 (*Left*) Fingertip type Cause unknown (typewriter keys suspected)
Figure 75 (*Right*) From turning key of car (nickel)



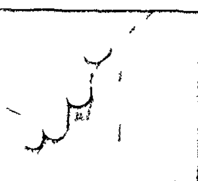


Figure 16 Figure 17

Plastic Playing Cards Small Screwdriver

Figure 16A Figure 17A





finger grip type. Because of the twisting motion it extends somewhat further into the lateral parts of the fingers, especially the radial surface of the middle finger. Examples of this pattern are dermatitis from habitually turning a key (Figure 75), the knob on a radio or on the door of a safe, the cap of a medicine bottle, and a small screw driver. Less extensive lesions from articles of smaller size are encountered from a watch stem or a tooth paste cap.

Case 3. H. F., an 8 year old girl who had been under our care for two years because of bronchial asthma, developed a contact dermatitis on the first three fingers of the right hand as noted in Figure 76. The pattern was typical of the finger grip type. Our search for the cause therefore narrowed down to such items as crayons, tops of medicine bottles, foods held by the fingers. This led to the determination of the fact that the child had recently acquired the habit of playing with her mother's lipstick, to the plastic container of which she showed a strongly positive reaction on patch testing. The elimination of the lipstick resulted in clearing of the lesion.





Figure 13 Figure 14 Figure 15

Fingering Hair Zipper Polishing Shoes

Figure 13A Figure 14A Figure 15A





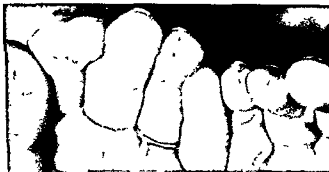


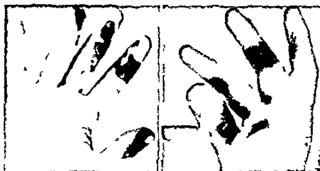

Figure 74 (*Left*) Fingertip type Cause unknown (typewriter keys suspected)
Figure 75 (*Right*) From turning key of car (nickel)



Figure 18 Figure 19

Winding Up Vacuum Sweeper Cord* Scissors

Figure 18A Figure 19A



types (Figure 65) depending on the size of the object If it is larger than the size of a plum, the grip extends into the lower portions of the fingers and into the distal part of the palm (Figure 23P)

Finger Band Type (Figures 18P 21P) Band like patterns originate from nickel present in rings and from creams or soaps caught beneath the ring They usually affect the opposing surfaces of the adjoining fingers (Figure 77) † Curling the hair around the fingers as some women do accounts for a relatively common and very typical lesion of the band type It is localized on one of the fingers of the left hand usually the middle finger A lesser eruption from the hair setting fluid is found in the finger grip area on the right hand which does the curling Other modes of producing a band shaped lesion are habitual handling of elastic bands, and winding dyed knitting yarn or the rubber cord of electrical equipment around the fingers A dermatitis with a band like pattern in a post office employee was noted by

* Transition to horizontal bar type

† In dermatitis from a ring the lesion on the finger corresponds fully to the shape of the ring whereas the band design from soap is not as regular and complete because the soap lodges only in certain parts of the ring shaped area





Fig ire 20 Figure 21

Rubber Band Curling Ha r Around F nger

F g re °0A Fig re 21A



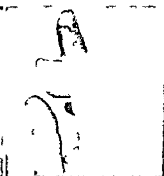




Figure "9 Turn ng telephone dial with index and m ddle finger (n kel)

Berman[13] It was caused by winding manila twine around two fingers in the process of bind ing mail bags

Handling scissors produces a characteristic dermatitis with the pattern of incomplete rings on those fingers which are in contact with the scissors (Figure 19P) It is due to nickel or lacquer

Finger Cap Type (Figures 22P 23P) It is relatively easy to establish a causative diagnosis in a dermatitis of the finger cap type if the eruption is produced by such articles as a plastic or metal thimble (Figure 78) or a rubber finger cot Less clearly demarcated are lesions produced by contraceptive pills or jellies They involve the distal parts of the fingers which are irritated when the contraceptive is inserted into the vagina[203] A resident physician (Case 10) developed a chronic dermatitis on the index finger (Figure 79) when he was transferred to the obstetrical







Figure 22 Thimble

Figure 23 Telephone Dial

Figure 24 Habitually running hand *through hair (cosmetic)*

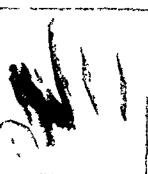
Figure 22A

Figure 23A

Figure 24A







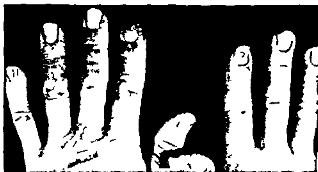


Figure 80 From hypodermic medication of pantocaine solution (veterinary) Although there is more or less general involvement of both hands the finger cap pattern can be clearly discerned



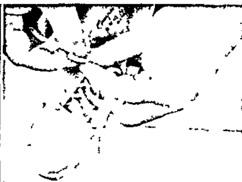


Figure 25 Figure 26

Cigarette Holder Tying Shoe Laces

Figure 25A Figure 26A









Figure 81 (Left) From cigarette holder (plastic) touching area between second and third fingers

Figure 82 (*Right*) Plant dermatitis, aggravated by ammoniated mercury


Figure 27


Figure 28


Figure 29

Pen
Pencil } Two Different Grips

Golf Tee

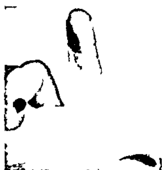
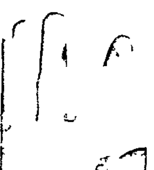

Figure 27A


Figure 28A


Figure 29A

service where he had to use the telephone frequently The lacquer on the holes of the dial had worn off and the finger thus had contact with the metal Nickel proved to be the cause

If due to dipping the fingers into fluids (oils detergents disinfectant solutions), the sharp line of demarcation instantly betrays its origin In a dermatitis originating from a plastic bowling ball or the powder employed in gripping it cap lesions are present on thumb index and middle fingers This pattern is somewhat less distinct in lesions from hypodermic injections of such medications as penicillin streptomycin and local anesthetics (Figure 80) It is seen in veterinarians dentists nurses and doctors The eruption occurs principally on index and middle finger through leakage of fluid from syringes where the needle is attached I have observed several individuals who developed sensitivity to a large variety of hypodermically administered drugs after they had disregarded minor eruptions due to a single offender A case of a bookbinder with dermatitis on four fingers reported to me by Berman was due to mucilage

Lateral Finger Type (Figures 24P 29P) Among lesions on the lateral

surfaces of fingers, the adjoining areas on middle and index fingers are a favorite site of dermatitis. Many articles are held between these fingers, as for instance plastic pens, pencils, cigarettes, cigarette holders (Figure 81) or such metal instruments as a dentist's drill. Cigarettes are undoubtedly the most frequent offenders. Some brands appear to sensitize the skin more readily than others, a fact which is due to their content of such chemicals as ethylene glycol. Some individuals are sensitive to cigarette paper. Lesions from pencils or pens involve in addition the web space between the thumb and index finger. If a dermatitis located between index and third finger is very acute (Figure 82) we should bear in mind that it might be a plant dermatitis. In winter, when the plant is denuded of leaves, a twig from a poison ivy or other poisonous plant is sometimes held between these two fingers without the patient's knowledge. A billiard cue produces a characteristic pattern on the adjoining surfaces of middle and index fingers. It is combined with an eruption on the radial part of the thumb where the cue touches. Dermatitis from shaving cream or after shaving lotion affects the lateral parts of the first three fingers because of friction with the hair stubbles.

Radial Portion (Figures 30P, 32P). Another group of lesions is located on the lateral surfaces of the fingers, the radial side manifesting much more irritation than the ulnar portions. This is noted in dermatitis from holding plastic playing cards (Figure 83), soft covers (leather) of books, manila folders, or rotogravure newspaper. These parts of the fingers lie in



Figure 83 (*Left*). From plastic playing cards.

Figure 84 (*Right*). Leather key case dye. Note lateral finger type: radial aspect from bending fingers around object.







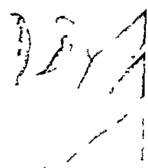
Figure 30 — Holding Plastic Playing Cards — Figure 30A

Figure 31 — Holding Newspaper — Figure 31A

Figure 32 — Plastic Hand Mirror — Figure 32A







contact with the irritating material because they are bent around the object (Figure 84) Frequently gripping a leather billfold or pocket book or a leather container for spectacles produces patterns of this type A lesion which requires a great deal of detective skill by those unfamiliar with the pattern is due to leather shoe strings or to shoe polish (white, brown and black) on shoe laces In the process of tying the laces most intensive contact with the skin occurs on the radial surfaces of index, middle, and ring fingers, and on the volar part of the thumb (Figures 85 and 26P)

Case 4 Miss H Z a 38 year old woman was seen on December 13 1948, with chronic lesions of dermatitis on both hands This pattern represented a transition between the lateral finger type and the finger-cap pattern as indicated in Figure 85 This had been present since September It started on the dorsal surface of the third finger In June, she had a similar lesion in the same area which lasted only a few weeks and cleared spontaneously For the past 3 years, the patient had been a waitress at a hospital where she had contact with such items as chairs, tables metal trays plastic

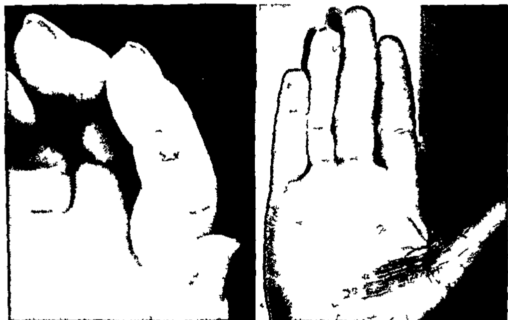


Figure 85 (*Left*) From white shoelaces

Figure 86 (*Right*) From label of tin can Example of chronic exposure (housewife)

ashtrays The pattern of the eruption suggested that either handling keys or the use of scissors caused the lesions The patient stated that the condition flared up daily at work in the afternoon when it would swell and get red A large number of patch tests were done which included constituents of the items mentioned above as well as soaps and cosmetics These tests and careful observation of the patient for several weeks failed to furnish any clue about the lesion There was no improvement whatsoever

At that time some of the diagrams were returned to me from various dermatologists in reply to a questionnaire asking them to designate additional patterns from their own experience One of these suggested that shoe polish on white shoe laces causes lesions on the fingers Comparing our lesion with this pattern definitely implicated this mode of origin A patch test gave a 4 plus reaction and the lesion disappeared within 2 weeks following the elimination of shoe polish The patient was in a habit of lacing her white shoes before noon when she started to work

Comment In this case the patient s full cooperation and careful observation on our part failed to furnish information concerning the cause Becoming aware of the "shoe lace pattern solved the case

There is a gradual transition of this pattern into the vertical bar type described below, in which irritation of the radial surfaces on the fingers can be observed from bending the fingers around the object



Figure 33

Atomizer Bulb



Figure 34

Small Metal Drinking Cup

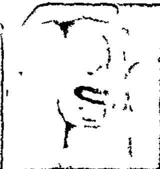


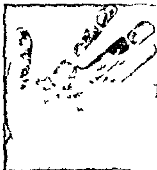
Figure 35

Peeling Potatoes

Figures 33A and 34A



Figure 35A



Ulnar Portion (Figure 81P) Conversely if the object is in contact with the dorsal part of the hand the opposite or ulnar aspect of the fingers is the seat of the eruption This is seen for instance when the fingers rest on a *flat* surface, such as a leather arm rest or a bridge table

2 **Fingers and Palm** The second group in our classification of patterns on the hands comprises lesions on both the fingers and the palm They are the ball types the horizontal and vertical bar types the central and lateral palm types

Ball Types The small ball type is a modification of the finger grip type (Figures 33P 44P) It originates from gripping a ball in the same manner as in the finger grip design the object however is larger in size It involves the three fingers noted in the finger grip design in combination with the adjoining portion of the palm The larger the ball the farther does the pattern extend diagonally across the hand toward the hypothenar area

Large Ball (Figure 42P) A football or a large grapefruit produces lesions on the whole inside surface of the hand with the exception of its

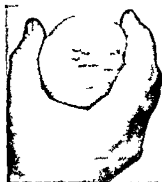




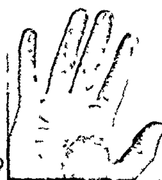


Figure 36 Figure 37 Figure 38

Orange Grapefruit Door Knob

Figure 36A Figure 37A Figure 38A







central portion where the object does not touch the skin A large rubber ball was the source of a very chronic seasonal dermatitis which manifested this pattern It occurred during the summer months and was aggravated on weekends when the patient went swimming at his summer place at the lake On tiny hands of young children we observe lesions of the large ball type from smaller sized balls because the object is large in proportion to the size of the hand

Large cylindrical objects are gripped in the same manner Thus the large ball type was encountered in a bartender habitually handling a nickel cocktail shaker and in a housewife who had frequent contact with the colored labels of large tin cans advertising a certain brand of fruit juice (Figure 86) In a horse fancier a dermatitis with the same pattern was observed from the black dye of his riding boots (Figure 43P) Even rectangular objects such as shoe boxes handled by shoe salesmen (Figure 69), may be responsible for this pattern In all these cases there is a close similarity in the mode of contact although the objects differ considerably in shape and do not necessarily resemble a ball



Figure 39

Half Grapefruit

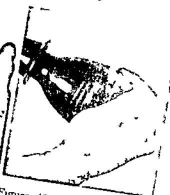


Figure 40

Douche Bulb

Figures 39A and 40A



Small Ball (Figures 33P 36P) Smaller balls and other objects gripped in the same manner account for the "small ball" type Characteristic of this pattern is the lesion due to an orange or small grapefruit It touches the base of the thumb, index, and middle fingers, as well as the adjoining portion of the hand An asthmatic individual who habitually handled the rubber bulb of an atomizer * exhibited a lesion with this pattern (Figure 81) Another example of this contact was a very chronic dermatitis on the right hand due to the rubber bulb of a perfume spray The patient had identified several exacerbations of this lesion with wearing a formal dress She always used this particular perfume on this occasion A woman employing a sponge for cleaning white shoes developed a dermatitis of the small ball type It affected principally the tips of the first three fingers where the contact with the shoe polish was most intensive Objects of similar size, though not ball shaped, which produce practically the same design

* The fact that this is the only case which I have observed among more than six thousand patients with asthma indicates the rarity of this condition most patients with asthma are or have been using atomizers



Figure 87. Typical ball type atomizer ball (rubber)



Figure 88. Contact with lawnmower handle contaminated with poison ivy (horizontal bar type plus contact on wrist). Note eruption in web spaces with ivy sap.





Figure 41 — Label of Tin Can

Figure 42 — Large Ball

Figure 43 — Heel of Boot or Shoe



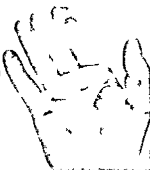


Figure 41A

Figure 42A

Figure 43A

are a pocket knife, a leather key case, cigarette lighter, an electric razor and a match box. They are held in the hand in the same manner as a small ball (Figure 44P). If the object is oblong such as the nozzle of a rubber hose it is transitional to the bar type (Figure 45P).

Bar Types, Horizontal (Figures 46P-51P). The horizontal bar type caused by habitually gripping a bar in a horizontal position affects the bases of the four fingers and the distal third of the hand. The thicker the bar, the farther the lesion extends into the hand, as for instance in dermatitis from frequently gripping a stair rail (furniture polish, varnish) or using a clothes brush. The more tightly the object is held, the more does the web space between index and thumb and the volar surface of the thumb become affected. If bilateral, the horizontal bar type may be caused by the use of athlete's bars in gymnastics, by grasping the metal or plastic handle of a baby carriage, or the wooden or varnished handle of a lawn mower (Figure 88). The metal handle of a kitchen drawer may give rise to bilateral lesions since the drawer is often pulled by the left hand when the right carries dishes or other utensils.



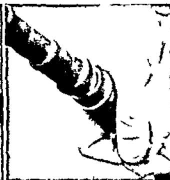




Figure 44 — Figure 45 — Figure 46

Cigarette Lighter — Garden Hose — Brief Case Handle

Figure 44A — Figure 45A — Figure 46A







A unilateral lesion which is relatively common arises from a knife with a thick wooden handle This has been described [85] as cocobolo wood dermatitis (Figure 18) Other examples are such elongated objects as a rope, a wire covered by insulating material, a dog leash, a leather handbag strap and the plastic or leather handle of a handbag Another mode of gripping a handbag accounts for a similar pattern It is due to carrying a bag attached to a shoulder strap Such a bag is held with the hand on its bottom surface, thus inducing a dermatitis principally on the base of the four fingers Larger areas of the hand are involved when the patient carries a more voluminous bag, such as a leather brief case This design is also seen in dermatitis from habitually carrying a book as school children do Dyes, glue, resins, and certain kinds of paper are the causative agents If these objects are larger, their pattern shows a gradual transition into the large ball type (Figure 66)

Vertical (Figures 52P-62P) If a bar is held in an oblique or vertical position instead of horizontally, a distinctly different pattern can be dis-

cerned Its shape is somewhat suggestive of a "Z" This is especially characteristic when the grip is very tight, as in dermatitis from the leather dye of golf clubs The fingers are bent around the object, which accounts for irritation on their lateral surfaces which face the thumb Other sources which can be identified with this design are the tennis racket, the flashlight and the wooden, plastic, or metal handles of various other objects The handles of a saw, a trowel, a refrigerator, or an electric iron favor the base of the fingers Lesions caused by more massive "handles" such as a tele phone receiver, a vacuum cleaner, and a rubber hose extend further into the palm The plastic steering wheel of a car gives rise to a dermatitis in which we can discern basically the same pattern (Figure 89) It tends to spread into other areas of the hand because of frequent changes in the grip during the course of driving In children, dermatitis of the vertical bar type develops on both hands from two outstanding sources they are the plastic, rubber, or metal grip on a bicycle and the handle of a jump ing rope There are transitional phases between the vertical and horizontal bar type (Figure 52P)



Figure 89 Vertical bar type from plastic steer ing wheel

Palm Type The length of the bar and the mode of gripping it determine a gradual transition of the bar type pattern into that of the central and lateral palm type

Central (Figures 63P 66P) Most lesions in the central portion of the palm originate from an ob long object For instance, the end of a short handle of a frying pan will habitually contact the palm whereas a long handle induces a bar type pattern If the end of the bar is rounded, as that of the knob of a whisk broom or a cane, other parts of the hand are completely free from irritation This is particularly characteristic when the end consists of a different material than the other portion of the object, such as in an old fashioned gear shift with a rubber knob (Figure 90) or a small pencil with an eraser A relatively common source of this pattern is the metal knob of a fluid soap dispenser, another oblong object because of its cone shaped end The nickel or chromium of the knob or the soap are responsible for a circular, well circumscribed lesion (Figure 91)

Other lesions in the central part of the palm can be attributed to habitually placing into the palm such substances as tooth powder (Figure 92), toothpaste, creams, fluid cosmetics, pills, tablets, or certain foods Cazort[21] reported such a lesion in a person habitually taking aspirin I have seen this pattern in a woman sensitive to the coating of vitamin tablets (Figure 93) Here again the medicine bottle or the tooth brush may be thought of as being the "bar," the end of which touches the central portion of the hand

The following additional examples of dermatitis with the central palm design were related to me A patient who habitually cleaned his denture in the palm of the hand was sensitive to a cream containing anise oil which he employed for this purpose The lesion was in the left hand where the denture was held[196] A nurse who routinely rolled cotton on wooden applicators (an oblong object) had a dermatitis in the palm of the left hand which was attributed to the cotton In a baker, the metal center of a rolling pin handle accounted for dermatitis on both palms They cleared up promptly upon avoidance of this contact by means of rubber gloves The plastic handle of a small screw driver was responsible for a lesion on the central part of the palm A combination of this pattern with that of the "finger grip" type occurred from a screw driver of a larger size and from the plastic handle of a razor (see below)



Figure 90 From old fashioned gear shift (rubber) only present in summer when no gloves are worn

A dermatitis in the central palm occasionally is seen in women who have started their menopause



Figure 91 (*Left*) Frequent contact with fluid soap dispenser (nickel and soap)

Figure 92 (*Center*) From tooth powder

Figure 93 (*Right*) From coating of vitamin tablets, poured out of bottle in lefthanded individual

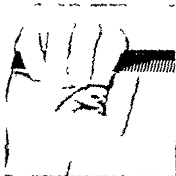


Figure 47



Figure 48

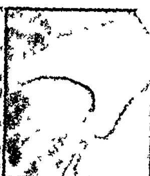


Figure 49

Comb

Thick Knife Handle

Thick Stair Rail

Figure 47A

Figure 48A

Figure 49A







The pruritus may be due to endocrine changes and then become aggravated by scratching and irritation from nail polish or due to sensitivity to drugs which are applied to this area for the relief of itching

Lateral (Figures 67P 72P) Lesions localized more laterally in the palm suggest a contact closely related to the vertical bar grip The end of the bar produces the lesion in the palm, holding the bar affects the first three or four fingers The bar is usually shorter and the grip less tight than in the vertical bar type This pattern is observed in dermatitis from grating horse radish (Figure 94), peeling carrots, cleaning celery, and scaling fish It occurs in the left hand which holds the object, whereas the right hand exhibits minor lesions usually on the index finger The short handle of a hand mirror produces a lesion on the palm which is sometimes combined with the "finger grip" pattern (Figure 32P) Gripping an umbrella handle or the end of a vacuum cleaner tube, and handling a wooden mixing spoon induces lesions on the lateral parts of the palm Their pattern shows a gradual transition into the vertical bar type

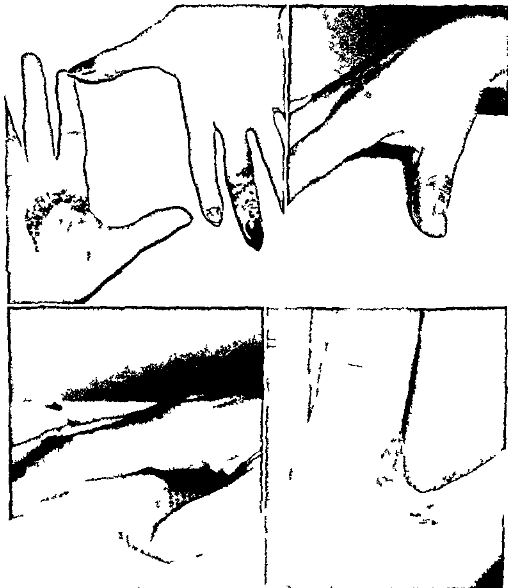


Figure 94 (*Upper left*). From grating horseradish in left-handed person. Object held in right hand. Left middle finger irritated through friction and contact with juice.

Figure 95 (*Upper right*). From a rubber shower appliance attached to bathtub.

Figure 96 (*Lower left*). From spilled merthiolate solution on medicine bottle.

Figure 97 (*Lower right*). Very common interdigital localization, cause unknown. Possibly knitting wool but not proved. Often wrongly diagnosed as fungous infection.


Figure 50

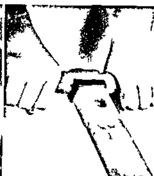

Figure 51


Figure 52

Thin Rail | Lawnmower Handle | Steering Wheel

Figure 50A



Figure 51A



Figure 52A



If the radial and ulnar portions on a hand namely the thenar and hypothenar are affected simultaneously we should consider an object with a two pronged handle This was noted in cases in which the paint of a hedge clipper the handle of a grease gun (Figure 73P) and that of a gasoline hose were sources of dermatitis A somewhat unusual contact resulted in a lesion across the palm It was due to the leather insert of a cloth glove The shape and size of the lesion corresponded to that of the leather piece of the glove

Medial An area below the center of the palm near the wrist is the site of another group of lesions This is seen in a bartender who habitually contacts the tap of a bar Shay observed this pattern on both palms of an artillery officer who frequently carried shells to the base of which explosive powder adhered The medial palm type also occurs in brick layers When they carry bricks the portion of the palm between thenar and hypothenar near the wrist becomes irritated

3 **Patterns Involving Finger Webs** *Thumb-Index Area Open Box Type* Among lesions on the finger webs those confined to the thumb index



Figure 53

Flashlight



Figure 54

Tennis Racket



Figure 55

Pan Handle



Figure 53A



Figure 54A



Figure 55A

area are undoubtedly most common Grasping an open box produces a typical pattern ("open box" type, Figures 74P-76P) which I observed on the hand of a cashier who habitually gripped the edge of a lacquered cash box, and in a beauty operator, from a plastic manicure tray which contained the tools of her daily work A hotel maid had a similar eruption from habitually handling a plastic ash tray A lesion was seen in a housewife which had developed farther into the palm It proved to be due to a leather waste paper basket *Individuals habitually holding an open paper bag, as grocers do,* show lesions of the same design The degree of extension into the palm between thumb and index finger is dependent on the size and weight of the "open box" If heavy, a tight grip is required, whereas a small, light box can be gripped with thumb and index finger only

Dorsal Aspect of Thumb-Index Area In contrast with the open box type which favors the volar aspect of the thumb index area, some lesions involve mainly the dorsal parts Examples of this contact are a dictaphone mouthpiece, or a rubber shower appliance attached to the bathtub (Figure 95) A clerk manifested a lesion on the thumb index area from habitually







Figure 56 Figure 57 Figure 58

Toothpaste Vacuum Cleaner Handle Golf Club

Figure 56A Figures 57A and 58A





gripping the varnished gate of an office partition Brachman[18] observed a dermatitis in a telephone operator on the dorsal surface of the thumb index region It was due to constant contact ("milking") with the switchboard plugs Spilled medicine (Figure 96), often adheres to the bottle and can thus produce a contact dermatitis in the thumb index area of the left hand where the bottle is held

Flat Object Design Another slightly different pattern in the thumb-index area arises from gripping the edge of a flat object such as habitually picking up a rug (dye) The basic design in dermatitis from gripping plastic playing cards (Figure 30P) simulates this pattern There is, however, a great deal more irritation on other parts of the hand because of additional contact in playing Dermatitis from the rotogravure ink of a newspaper (Figure 31P), an open book, or an opened magazine (paper, ink, materials in its cover) appears either in the same area or in the web space between index and middle finger, continuing downward through the palm

Transition to Ball Type From gripping the heel of a shoe or the colored label of a tin can, a design is produced in the thumb index area which







Figure 59 — Electric Iron Handle

Figure 60 — Bicycle Handle

Figure 61 — Telephone Receiver







Figure 59A

Figure 60A

Figure 61A

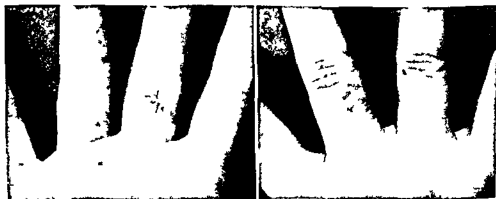


Figure 98 Contact with button sized door knob (nickel) Volar and dorsal aspect

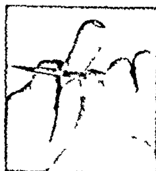


Figure 62

Cleaning Carrots

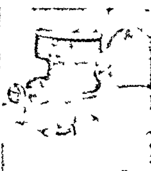


Figure 63

Fluid Soap Dispenser



Figure 64

Tooth Powder in Palm of Hand



Figure 62A



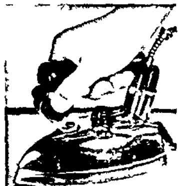
Figure 63A



Figure 64A

affects in addition the lateral surfaces of the adjoining two fingers Thus the thumb index design leads gradually into the small ball type (Figure 76P) In a child sensitive to rubber, this pattern occurred simultaneously with a lesion on the lips from blowing up a rubber balloon Kirby [94] encountered the same pattern in dermatitis from the rind of oranges in persons juicing the fruit with a Mix Master

Other Web Spaces (Figures 77P 80P) In my experience dermatitis on the web spaces on other fingers has been most difficult to track down to its source Placing a golf tee into the ground occasionally affects the area between the second and third fingers in an individual who is contact sensitive to the plastic or dye Between the third and fourth fingers I observed a dermatitis in a woman from drawing dyed wool through this area while knitting (Figure 97) A leather key case was responsible for a lesion at the same site extending somewhat into the palm (Figure 84) When the key was turned in the keyhole, the leather case was pushed into the web space A button sized door knob caused a similar lesion between the third and fourth fingers (Figure 98) A dermatitis which seems to be more prevalent



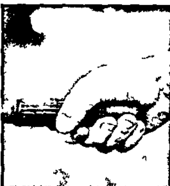




Figure 59 — Electric Iron Handle

Figure 60 — Bicycle Handle

Figure 61 — Telephone Receiver

Figure 59A

Figure 60A

Figure 61A











Figure 98 Contact with button sized door knob (nickel) Volar and dorsal aspect


Figure 68


Figure 69


Figure 70

Plastic Razor Handle

Thin Fork and Knife

Umbrella Handle

Figure 68A

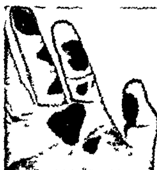


Figure 69A



Figure 70A



than is generally realized is due to the chromium or nickel of the handle on a cross shaped faucet (Figure 99) It affects the thumb-index and second interdigital area with some involvement of the palm Some contacts under the heading of lateral finger type should be considered here since they may involve the interdigital web spaces

Lesions between the fingers must be differentiated from those induced by soaps oils creams, and other fluid agents The latter are rarely confined to one or two interdigital spaces and tend to spread along the lateral parts of the fingers and into the hand (Figures 100 and 101) Contact dermatitis between the fingers is often complicated by secondary fungous infections Moisture from perspiration forms a favorable medium for the growth of molds While primary mycoses especially monilia infections are by no means uncommon in the interdigital areas we should guard against the erroneous conclusion that a positive fungous culture necessarily rules out the possibility that a contact dermatitis was the original source of the lesion (Figure 97) An interesting combination of a contact dermatitis with atopic





Figure 71 *Figure 72* *Figure 73*

Brush Handle — Vacuum Cleaner Handle (Different Grip) — Grease Gun

Figure 71A Figure 72A Figure 73A





sensitivity to yeast occurred on the web surfaces of a bartender's hand from gripping wet beer glasses between the fingers

4. Wrist (Figures 81P-82P) There are several complex patterns, typical of certain contacts, which are localized about the wrists They involve portions of arms and hands as well On the ulnar part of the wrist and hand a lesion occurs from placing the ulnar side of the hand on a flat surface, as seen when writing on a leather desk pad or in draftsmen who have contact with drawing paper (Figure 102) I observed a woman who had such a lesion because of her sensitivity to a dye present in the cover of her sewing machine Another was sensitive to the oiled cloth of the kitchen table Another housewife developed a lesion of the "flat surface type" from habitually resting her hand on a rubber mat on her electric range According to Brachman [18] office clerks who habitually seal envelopes develop lesions with this pattern The envelope lies on a flat surface, and the ulnar part of the wrist and the hypothenar is in contact with the moistened mucilage when the hand presses on the envelope to seal it A lesion suggestive of this contact was due to an iodine burn (Figure 103).

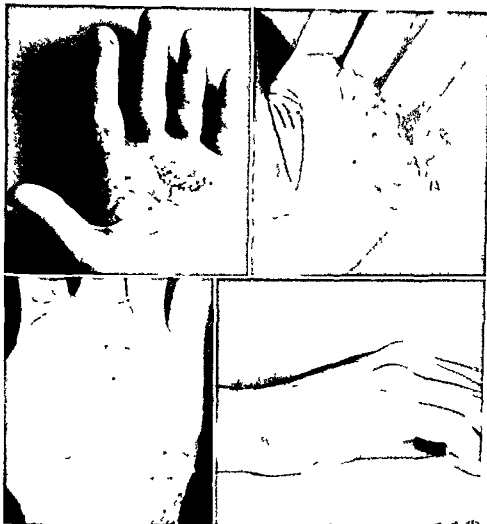


Figure 100 (*Upper left*) Glove powder dermatitis (surgeon)

Figure 101 (*Upper right*) *Drug dermatitis from ammoniated mercury ointment*

Figure 102 (*Lower left*) From rubberized desk top "flat surface type"

Figure 103 (*Lower right*) Dermatitis from iodine simultaneous iodine burn simulating "flat surface type"

Another complex pattern on the wrist is encountered when a woman carries a leather or plastic handbag (Figure 104) It involves the volar surface of the palm, wrist, and lower forearm on which the bag rests If, however, the handbag is hanging by a strap over the wrist, the dermatitis appears on the dorsal and radial portion of the wrist where the strap is in contact with the skin (Figure 105)







Figure 74 Figure 75 Figure 76

Wastepaper Basket Holding Tray Holding Wooden Bowl

Figure 74A Figure 75A Figure 76A













Figure 104 (*Left and center*) From carrying woman's purse (black dye) in hand

Figure 105 (*Right*) Carrying purse by strap hanging over dorsum of wrists (leather dye)



Figure 77

X Shape Water Faucet on Basin



Figure 78

X Shape Water Faucet on Wall



Figure 79

Rectangular Compact

Figure 77A



Figure 78A



Figure 79A



Probably the most common lesions on the wrist are produced by the cuffs of coats, by a leather jacket, by a fur trimmed overcoat, or by the cuffs of dyed shirts (Figure 106) They appear in the radial portion where friction with the sleeve is most pronounced Dermatitis from a leather or nickel containing wrist watch strap presents no diagnostic difficulties if we know that it is more prevalent in summer when people perspire and that its pattern follows the outline of the causative object (Figure 107) Lesions due to the nickel clasp of a wrist watch strap have a patchy appearance (Figure 108) They are localized on the volar area of the wrist Because of the movement of the hand, a dermatitis from a wrist watch clasp often affects a much larger area than we would expect from the size of the object The wrist watch itself is sometimes the source of a lesion on the dorsal part of the wrist

Patterns encircling the wrist are due to dermatitis from bracelets in women or to certain trinkets worn on bracelets In men a leather wrist strap may be responsible for a lesion encircling the wrist in a band like



Figure 80

Oval Compact



Figure 81

Handbag Strap

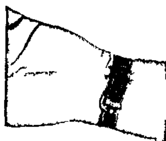


Figure 82

Wristwatch Buckle

Figure 80A



Figure 81A



Figure 82A





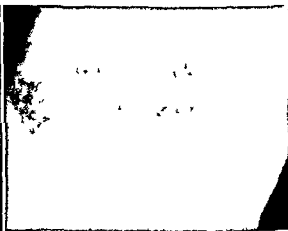


Figure 106 (*Left*) Lesion on dorsal part of wrist from reaching into trousers frequently dry cleaned Positive patch test to carbon tetrachloride

Figure 107 (*Right*) From wrist watch band (leather dye)



Figure 108 (*Upper left*) From wrist watch clasp (nickel)

Figure 109 (*Upper right*) Dermatitis from leather wrist bands (Courtesy Dr S Rothmann University of Chicago)

Figure 110 (*Lower left*) From adhesive tape used for sprained wrist Note sharp demarcation (Courtesy Dr J B Howell Dallas, Texas)

Figure 111 (*Lower right*) Atopic lesion which responded promptly to elimination of food





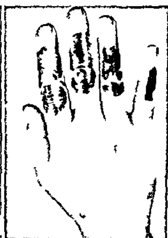
Figure 83 Lacquer of Card Table

Figure 84 Reaching into Stacked Drapers

Figure 83A

Figure 84A





fashion (Figure 109) I observed a dermatitis which covered both wrists in this manner It originated from the black cuff of a brown glove the black dye being responsible When rubber gloves are lined with cotton a similar lesion can originate from sensitivity to the rubber which protrudes above the cotton lining

5 *Dorsal Patterns* (Figures 83P 91P) Tracing the source of a dermatitis on the dorsal surface of the hand and instituting effective therapy are often fraught with considerable difficulties The reason for this may be the fact that the dorsal area is a favorite site for atopic eczema therefore contact lesions on the dorsum of the hand are often complicated by inhaled or ingested antigens to which sensitivity exists I have noted this so frequently that I have made it a rule to do intradermal skin tests on such cases if they do not respond properly to the elimination of the contact

agent, even though it is proven clinically and by a positive patch test to be the original source (Figure 111) Atopic lesions on the dorsal surface can be recognized by their sharp demarcation on both sides of the hand

A common denominator in a large number of lesions on the dorsal surface is the action of "reaching into" something or brushing against an object with the hand This is evident from the following description of the individual contacts If the spaces between the articles reached into are narrow (*e g* filing cards stacked trays) the dorsal parts of the fingers are affected

Case 5 Mrs R H, 67 years old seen in March 1951 presented an acute extremely itchy and irritated lesion of contact dermatitis on the dorsal part of the fingers of the left hand (Figure 112) The patient was left handed She had other outbreaks of dermatitis the cause of which was never clearly established One eruption in November 1950 was localized on the dorsum of the right hand another in December 1950 occurred 4 hours after she started to wear a black fur coat Its localization around the neck suggested that the dye of the fur was responsible yet a patch test performed at that time with the fur dye was negative The condition cleared up spontaneously

The pattern noted in Figure 112 on the fingers of the left hand was very characteristic of reaching into something Its localization in the dorsal parts of the fingers permitted us to draw a conclusion about the size of the

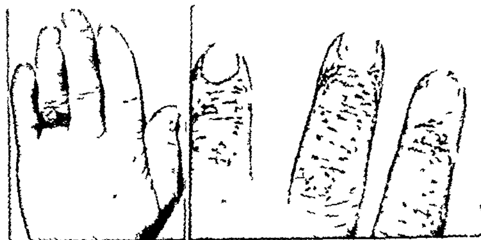


Figure 112 (*Left*) Dermatitis on fingers suggestive of "reaching into" narrow space (change purse)

Figure 113 (*Right*) Laundryman habitually reaching into stack of diapers sprayed with pine oil



Figure 85

Reaching into Manila Folders



Figure 86

Tucking in Bedding



Figure 87

Reaching into Woman's Purse

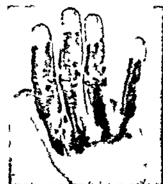


Figure 85A



Figure 86A



Figure 87A

object the space into which the patient was habitually reaching must have been very narrow since it did not admit the whole hand, the knuckles and wrist Such items as a box of filing cards, a pocket book, the leather container for her glasses were likely causes Thus it was established that the patient had recently bought a new change purse The brown dye of its silk lining gave a positive reaction Elimination of the purse cleared up the lesion We checked again on the patch test of the fur and obtained a 2 plus reaction This suggested that cross sensitization existed between the dyes of the two articles

Comment The pattern in this case implicated a limited number of objects and led to the detection of the cause The fact that a dye was responsible made us repeat the patch test for the fur dye and thus establish definitely the source of the previous lesion on the neck

If the articles to be contacted are further apart, (*e g*, the two inner surfaces of a woman's handbag or the two sides of a cardboard box) the lesions are found on the dorsal surfaces of hands, wrists and elbow The dorsal patterns are to be discussed in the following order lesions predominantly a) on the fingers b) on the knuckles and c) on the hand

On Fingers Habitually reaching into a box of filing cards produces lesions on the back of the fingers especially in the region of the distal finger joints where the fingers brush against the cards the volar surfaces usually remain free from irritation A diaper laundryman had a very chronic dermatitis on the dorsal surface of the fingers For years he had had daily contact in his work with a pine oil deodorant through reaching into stacked diapers (Figure 113) A practically identical pattern was observed in a waitress who in pursuance of her occupation had to reach into stacked wooden food trays A lady selling stationery had a similar lesion from habitually opening and reaching into paper cartons A strongly positive patch test reaction to the paper was obtained A very characteristic lesion is seen in teachers involving the dorsal surfaces of all fingers at their distal portions The lesions are due to the dye in the colored chalk which comes in contact with these areas when writing is erased from the blackboard (Figure 114)

Pitcher's dermatitis in professional baseball players described by Cisneros[23] affects the dorsal aspect of the right middle and index fingers Before pitching the ball the player touches the gloved hand with the hand holding the ball in the well known manner Friction and contact with the leather dye of the glove produce the lesion on the fingers of the pitching hand I have recently seen this pattern in several school boys following this practice of the professional player (Figure 115)



Figure 114 Dermatitis (teacher) from erasing colored chalk from blackboard

Metacarpo phalangeal Area The area on the proximal end of the fingers is a favorite site for dorsal lesions because the knuckles protrude when reaching into something thus rubbing against the object A nurse had a lesion on this area from habitually reaching into the cabinet where plastic hospital charts were suspended An individual afflicted with chronic nasal disease showed a dermatitis limited to the same site from habitually brushing against the edge of Kleenex boxes A dermatitis on the ulnar aspect of this area was observed in a housewife The action of tucking in the bed ... household chores w... polish applied to t... doctor's bag accoun... patterns confined to the knuckles of the rig... hand They were caused by contact with the rough nickel edge of the zipper inside the bag A more extensive eruption was seen in another woman from the leather dye inside her bag It was brought about by brushing against the leather bag when reaching into it A patient



Figure 88

Reaching into Fruit Crate



Figure 89

Reaching into Trouser Pocket



Figure 90

Reaching into Coat Pocket



Figure 89A



Figure 90A

was observed with the nervous habit of tucking his hands between his trousers and shirt Thus a lesion from leather dye originated on the knuckles which rubbed against the belt

Habitually touching a boiler surface in order to determine whether the boiler is warm accounted for a dermatitis at the same portion of dorsal surface from oil adhering to the boiler (Figure 116A) Several persons were observed with lesions in this area due to contact with the lining of *the trouser and coat pockets which had been soiled with nickel from* coins key chains keys with phosphorus from matches and with a red dye from golf tees carried in the pocket A file clerk had a lesion from habitually reaching into a filing cabinet (Manila folders Figure 116)

Case 6 Mr A W 23 years of age was seen on June 15 1949 with a lesion of dermatitis on the radial surface of the left wrist Its appearance was very chronic scaly and the skin was thickened suggestive of having had extensive x ray treatment He had had infantile eczema which cleared up in his early teens About a year and a half ago he developed a contact



Figure 115 (*Left*) "Pitcher's Dermatitis" on index and middle finger (boy)
Figure 116A (*Center*) Habitually touching boiler soiled with oil
Figure 116B (*Right*) Habitually reaching into manila folders aggravated by "Wonderful Dream Salve"

dermatitis on the volar surface of the wrist This was believed to be due to a metal wrist watch band but the condition persisted after elimination of the band Shortly afterwards it was treated with eight x ray exposures which improved the eruption for a few weeks but failed to make any distinct change On several occasions the lesions flared up following application of ointments A severe flare up had occurred before on the left wrist which was followed by a few pustular lesions and by bullous lesions on the back of the neck

Because of the pattern of dermatitis we could definitely rule out the wrist watch band which would have circled or nearly circled the wrist It could not have been a milker's dermatitis because it was localized too close to the thumb index area Instead the pattern was very typical of reaching into the trouser pocket as indicated in Figure 106 Following up this clue it could be determined that the patient had his suit cleaned on the day before the condition started The lesions on the neck were also explained on this basis The cleaning fluid carbon tetrachloride dissolved in 1% vaseline gave a strongly positive reaction The lesion cleared up within a few weeks after the patient had avoided this contact

Comment This lesion is so characteristic of reaching into the trouser *pockets that it cannot easily be mistaken for anything else*

The fur dye of a muff was responsible for a lesion in the same area The pattern of milker's dermatitis described by Epstein[46] is localized principally in the radial portion of the dorsum of the hand where it brushes against the cow's hair A young man with an atopic dermatitis developed a contact lesion the pattern of which simulated that of a milker's dermatitis





Figure 91 Figure 93
Dorsal

Reaching into Cardboard Box Reaching into Fluid Substance Glove

Volar
Figure 91A Figure 92A Figure 93A







(Figure 68) It was due to gun powder escaping from a pistol while he was practicing pistol shooting

Mending and darning clothes can produce lesions on the radial dorsal part of the left hand, over which the material is stretched while the right hand is mending it Dyes to which sensitivity exists are usually the cause

Some persons have the habit of forming a cup between the thumb and index finger on the dorsum of the hand (the "snuff box area") where they place tooth powder or toothpaste This induces a distinct pattern of dermatitis According to Riordan,[136] an identical lesion is seen in printers and lithographers who use this part of the hand as a receptacle for paste, which is applied over parts of print which are not clear

Hand On the hand the portion near the thumb and index is most frequently affected A woman contracted a dermatitis on the dorsal surface of the wrist and hand from dog hair In leading her dog by his collar, she had the habit of reaching underneath the collar Thus only the dorsal surface of her hand had contact with the dog's hair More extensive lesions with a distinct pattern extending into the dorsal portion of the arm are seen from habitually reaching into pasteboard boxes in workers employed

in packing merchandise According to Riordan, a barber had a lesion on the dorsum of the hand from the rubber pad of a vibrator attached to this part of the hand In another case a lesion from the black leather part of gloves occurred on the dorsal surfaces of both hands, the volar parts remained free as this part of the gloves was made of cloth (Figure 117) I have seen several patchy lesions on the dorsum of the hand with extension into the arm from the wool of sweaters Friction through pulling the sweater over this area may account for this localization (Figure 118)

Transitional and Complex Dorsal Patterns Among lesions on other parts of the hand, the dorsal involvement may dominate the clinical picture An unusually acute and severe eruption was due to a plastic rosary wound around index and middle fingers The dorsal and lateral parts of these fingers showed the most extensive irritation as shown in Figure 119 In florists who "reach into" bunches of chrysanthemums, the lesions



Figure 117 (*Left*) From black leather glove, clear on volar surface because this part of glove was made of cloth

Figure 118 (*Upper right*) From wool complicated by infectious dermatitis on left hand Lesser irritation on flexor part of forearm Positive patch tests to dyed wool

Figure 119 (*Lower right*) From newly acquired plastic rosary resulted in a severe generalized dermatitis on repeated contacts



Figure 120 (*Upper left*) Chrysanthemum dermatitis (florist) from "reaching into bunches of flowers Little involvement of volar surface Seasonal flare ups in fall

→

on the dorsal surface are much more marked than those elsewhere on the hand (Figure 120) Other such instances are dealt with on page 77 under the heading Lateral Finger Type and on page 98 among lesions on the wrist

Patients in the habit of *scratching their hair can develop lesions on* the dorsal parts of the fingers from hair cosmetics This pattern is suggestive of the finger grip type being confined to the index middle finger and thumb however it is localized on their dorsal surface The identical lesion was observed in another patient from scratching other parts of the body contaminated with poison ivy sap

Among "complex patterns a lesion was encountered on the dorsal area of the hand and the central palm Its source proved to be a riding crop the dorsal lesion originated from reaching into the sling of the crop the one in the central palm from gripping the end of the shaft

6 Entire Hand Like dermatitis on other parts of the body a lesion no matter what its original source can spread from its primary focus to the entire hand if excessive sensitivity exists As a rule however the site of the original contact shows more severe irritation than the other parts Application of irritating or sensitizing ointments frequently contributes to the extension of the lesion

Whole Surface of Hand (Figures 92P 93P) The whole surface of the hands has primary contact with the causative agent when the hand is placed into a fluid or semi fluid substance *i e* in gasoline turpentine paint wave set solutions or soap suds (Figures 121 and 122) Eruptions from these sources affect the whole hand in a uniform manner a sharp line corresponding *to the fluid level limits the lesion Among industrial lesions* which thus originate dermatitis occurs among photographers or x ray technicians who dip their hands into developing fluid among nurses doctors and dentists who dip their hands into disinfecting fluids in window cleaners laundry workers and wash women from soap suds among bakers who mix dough which contains vanilla lemon cinnamon and other spices (Figure 123)

Prevailing Areas Not always however does contact of the entire hand with an agent result in an eruption distributed evenly over the whole hand *For instance* when an ointment or after shaving lotion *is* applied to a man s face the major irritation takes place in the thumb index area because of friction with the beard Fruit and vegetable juices settle pre

←

Figure 121 (*Upper right*) Cold wave setting fluid (beauty operator)

Figure 122 (*Lower left*) Acute case from single contact with cold wave solution Uniform distribution of vesicles characteristic of oily substance or ointment

Figure 123 (*Lower right*) Generalized dermatitis from cinnamon (baker) Less involvement on volar surface of thumb



Figure 128 (*Left*) From leather dye of wallet

Figure 129 (*Right*) From rubber cord passing between fingers (telephone operator)

time when the boy started to use a new wallet. A patch test for the wallet gave a strongly positive reaction. He was advised to eliminate this object and the lesions cleared promptly thereafter. There was also a positive reaction to the rubber of the bicycle grip. This contact was eliminated by covering it with adhesive tape.

Comment. This patient's lesion exhibited a pattern which was not characteristic of a contact known to us, yet was sufficiently clear to permit certain conclusions which led to the discovery of the cause.

Yet if we adopt a critical attitude in evaluating a pattern, we can considerably narrow down the causative diagnosis to fewer possible sources.

Thus, as shown above, most dorsal patterns are brought about by the action of reaching into or brushing against a certain object. If the dorsal lesions involve the fingers, the space "reached into" is very narrow, if they are present on knuckles, wrist and arms, it is wider. The majority of the volar lesions originate from gripping an object, whereas a uniform eruption affecting the whole hand suggests a fluid or semi fluid material.

The basic pattern on the fingers, the finger grip type, originates from gripping a small object. Touching an article with the fingers is an action characteristic of most lesions of the finger tip type. The finger cap type results from objects into which the finger is inserted, as well as non solid materials which are spread around the finger tips, like a solution given by a hypodermic injection. Ring or band shaped objects are responsible for the finger ring type. Irritation on the radial and lateral aspect of the fingers indicates that the object is gripped in such a manner that the fingers bend tightly around it, as in holdng a hand of cards.

If fingers and hand are affected, the objects as a rule are larger in size. Whether they are of the shape of a bar or of a ball can be clearly

recognized from the respective patterns The outline of a bar is especially characteristic when it is gripped in the oblique manner such as a golf club In tracing the cause of a bar type lesion one should consider handles of household appliances If an irregularly shaped object is gripped as for instance an x shaped water faucet, the lesion favors the parts around the finger webs The "open box type is another characteristic pattern suggestive of a definite action, namely, gripping the edge of an open box The fact that a lesion is localized in the central part of the palm is usually an indication that the end of an oblong object was responsible In dermatitis at the interdigital spaces we must always consider the possibility that an elongated thin object has been pulled or drawn through the fingers, such as a key chain or a rubber cord

Case 8 Miss G S, a 27 year old telephone operator presented the lesion on the left hand seen in Figure 128 This had been present for about three weeks, it started with vesicles typical of an acute contact dermatitis During the past four days, a similar lesion appeared at the same area on the right hand The patient gave an allergic family history she had been subject to hives and to nasal catarrhs The date of onset of this lesion coincided with the beginning of the hay fever season, the patient was sensitive to both ragweeds

In her present occupation as telephone operator, she had contact with telephone plugs rubber cord and a headgear The pattern noted in Figure 129 is somewhat suggestive but not characteristic of a bar type The "bar" must have been very thin since the lesion did not extend toward the thenar area as it usually does in lesions of the bar type The most likely explanation, therefore, was the cord of the telephone plugs This cord was made out of rubber, the plug itself which was in contact with the fingers was a plastic Since the finger grip" area was not involved the rubber cord was assumed to be responsible for the lesion On further questioning it was noted that the patient had been in the habit of pulling the cord between two fingers, this accounted for the involvement of the interdigital area The patch test to the suspected rubber material was strongly positive

This condition started at the hay fever season It is difficult to say whether or not the contact sensitivity to rubber was precipitated by inhalation of ragweed to which she was known to be sensitive or by her increased tendency to perspire at that time of the year, or whether the occurrence of the two conditions was coincidental

Comment A pattern may not always be characteristic of a certain contact, nevertheless it tends to lead us into the right direction in conjunction with the history

Lesions on all four web spaces extending into the lateral parts of the

fingers indicate that soaps, oils, or creams were their cause Thus, nearly every pattern discussed in this classification furnishes some clue regarding its origin

Combinations If there is a combination of two individual patterns, the implication regarding the nature of the causative agent is even more remarkable For instance, a dermatitis may represent the finger grip type in combination with an eruption in the central portion of the palm, we must infer that the "end of a bar" was gripped by the three fingers Such an object is a small screwdriver Another pattern combining the finger grip type with a bar type is the one produced by the hard rubber handle of an enema bag The design from a riding crop, mentioned above, combines a lesion on the dorsal area of the hand from "reaching" into the sling with one at the central palm, due to gripping the "end of a bar" Carrying a lunch box gives rise to a lesion of the horizontal bar type from gripping the handle of the box This is combined with a less extensive eruption on the dorsal parts of the fingers from 'brushing against" the box while carrying it by the handle

Sometimes the combination of two different patterns on each hand betrays the nature of the object For instance, using a vacuum cleaner produces the pattern of the verical bar type on the right hand from the rubber grip, and that of a finger grip type on the left hand from holding the cord

Another unusual combination of two patterns occurs when two major causes are at play, as in a dermatitis from a cigarette lighter and lighter fluid (Figure 130) The former produced a pattern at the palm, the latter irritated chiefly the interdigital spaces

Case 9 R C, 34 years of age presented a dermatitis on both hands The lesion was chronic, fissured, scaly and very itchy About eight years ago (1942), the patient had a very acute vesicular dermatitis involving both forearms and elbows Extensive x-ray treatment and other measures con



Figure 130 Lesion from cigarette lighter and lighter fluid

trolled the condition until a new flare up occurred in November, 1949 At this time the patient had taken up work as an admitting clerk at a hospital The condition became so severe that he had to be hospitalized for three weeks during which time it cleared up completely Three days after he resumed his work at the desk, a new flare up occurred

The pattern clearly suggested what we designated the 'flat surface type" of a lesion This involves the ulnar part of the hand and the dorsal ends of the 3rd, 4th and 5th finger, suggesting contact with a flat surface such as a bridge table, a sewing machine, the surface of a desk This led to the discovery that he had used a rubber desk pad since November, 1949 A patch test to the rubber gave a four plus reaction However we could not account for the lesion at the base of the 1st and 2nd fingers in Figure 102 Further questioning revealed that the patient, who had an artificial leg, used to support his body when getting up, by leaning with his fists on the rubber pad at exactly the area which was involved Elimination of the pad cleared up the dermatitis within three weeks

Comment This patient's pattern shows a combination of a relatively simple contact, the flat surface type, with another very unusual one After the determination of the first contact, it was relatively easy to establish the mechanism of the whole lesion



Figure 94A
Coat Sleeve

Complex Patterns (Figures 94P-96P) Other patterns are more complex and their sources have to be identified on the basis of previous experience with this pattern For instance, the lesions from carrying a handbag a brief case, or a book involve wide areas on the palm (Figure 104) which extend into a large portion of the lower arm Resting the hand on drawing paper or on a table top induces the 'flat surface" type which represents a minor lesion on the dorsal parts of the fourth and fifth fingers and a major one on the thenar and hypothenar of the hand It is similar to the one produced from applying furniture polish to a flat surface (Figure 131)

Transitions It has already been pointed out that transitions from one pattern to another are not uncommon They are often dependent on the size of the object It has been shown how the finger grip pattern can gradually turn into that of the "ball type" if the object is larger, how it will lead to the bar type" if its shape is elongated A lesion on the thumb index area can be regarded as a phase of the oblique bar type The pattern



Figure 95

Polishing Furniture

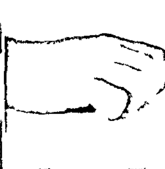


Figure 96

Drawing Paper



Figure 97

Hand Resting on Flat Surface

Figure 95A



Figure 96A



Figure 97A



of a bar of the thickness of a wide stair rail gradually turns into that of the large ball type (football) if the bar should be larger in size A certain substance may be present in different articles which accounts for new patterns at different times

Case 10 J T a 25 year old doctor was seen on November 24 1947 because of a lesion on the radial surface of the right index finger and on the thumb which was suggestive of *turning a key handling a leather key case or handling coins* (Figure 75) He had been subject to severe chronic allergic nasal disease The patch test to nickel was 3 plus and we were able to trace the lesion to the key of his car and the zipper of his pants The condition cleared up completely upon elimination of the contact

He was again seen in March 1948 when he showed the lesion illustrated in Figure 79 The onset of the present condition coincided with the beginning of his residency on the obstetrical service Again our search focused on sensitivity to nickel since the positive reaction to nickel persisted This time the pattern was suggestive of the finger cap type in other words the

patient was likely to insert his finger into a concave object or a hole This reasoning led to the detection that the telephone dial was responsible The lacquer on the phone that he was using to call the visiting obstetricians had worn off, and the dialing fingers had habitual contact with nickel The condition gradually subsided upon elimination of this cause The patient observed clearly that this and other skin manifestations of his sensitivity to nickel were always aggravated in midsummer when grass pollen was in the air, to which he gave strongly positive intradermal skin reactions



Figure 131 From furniture polish typical design due to holding cloth in hand patient left handed

Comment In spite of the fact that the patient s sensitivity to nickel was easily established, the determination of the individual objects responsible for the lesion was difficult This case further demonstrates that a lesion may clear up completely to be followed by another eruption from the same cause of an entirely different design

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If each pattern is thus made the subject of a careful scrutiny and of intelligent interpretation, the detection of the causative agents is indeed possible in the majority of cases

A summary of the causative agents on the fingers discussed in this chapter is found in Table VII

TABLE VII—*Continued*

SUMMARY OF CAUSATIVE AGENTS

3 *Patterns Involving Finger Webs*	
a THUMB INDEX AREA	b FLAT OBJECT DESIGN
Lacquered cash box	Picking up rug (dye)
Plastic Manicure tray	Plastic playing cards
Plastic ash tray	Gripping newspaper magazine, book
Leather waste paper basket	
Paper bag	
Rubber balloon	c OTHER WEB SPACES
Dictaphone mouth piece	Golf tee
Rubber shower appliance	Drawing dyed wool through fingers
Gate of office partition	Leather key case
Switchboard plug	X shaped water faucet
Spilled medicine on bottle	Key chain
4 *Wrist*	
a FLAT SURFACE DESIGN	b *WRIST ONLY*
Leather desk pad	Hand bag (leather, plastic)
Drawing paper	Hand bag strap
Sewing machine cover	Wrist watch strap
Sealing envelopes (manila paper)	Clasp of wrist watch strap
Furniture polish	Wrist watch
Hand lying on skirt (dye)	Bracelet
Leather arm chair (theatre seat)	Trinkets on bracelet
Oil cloth or plastic cloth	Leather wrist strap
	Cuff of gloves
	Cuffs (starch, dye, leather, fur)
5 *Dorsal Patterns*	
a ON FINGERS	Tucking shirt into trousers
Reaching into	Habitually touching boiler surface
box of filing cards	Contact with cow udder
stacked diapers (deodorant)	[illegible]
stacked wooden food trays	[illegible]
paper cartons	
Colored chalk (erasing from blackboard)	
Pitchers Dermatitis	
b ON METACARPO PHALANGEAL AREA	c ON HANDS
Reaching into	[illegible]
cabinet with suspended palstic hospital charts	[illegible]
box of cleansing tissues	citrus fruit crates
tucking in bedding	muff
Woman's handbag (dye)	Cotton gloves with leather back
Doctor's bag (zipper nickel)	*Rubber band*
trouser pocket	
coat pocket	
6 *On Entire Hand*	
Dipping hand into fluid or semi fluid substance	Wave set (beauty operator)
Gloves (rubber leather)	Developer fluid (x ray technician)
Soaps and bleaches	Household ammonia (oleic acid)
Hand lotion	Darning socks
Kitchen sink (nickel chromium)	Glove powder
Ointments	Insect powder
Paints	Cinnamon in dough

IX

Special Situations

Poison Ivy

Poison ivy is by far the most important single source of contact dermatitis Because of the relative ease with which people can become sensitive to poison ivy, it has become a favorite means for clinical and experimental studies on the subject of dermatitis

The Plant. Rhus toxicodendron or poison ivy is the well known three leaflet plant with a glossy surface and the characteristic white berries

There are several species of this plant which represent minor differences 1) Rhus toxicodendron radicans grows either as an erect bush or a climbing vine growing up on a tree, or as a low shrub three to four feet high The leaves have long stalks and are red tipped at a certain stage It is present in every part of the United States, except for the far west 2) Rhus toxicodendron diversiloba is found mainly in the southeastern states It generally grows as a shrub three to four feet high and under special conditions can grow into a tree like plant reaching a height of 14 feet Its leaves are somewhat curled resembling those of oak 3) Rhus toxicodendron vernis, "poison sumac," a member of the same family, grows as a tall bush with leaves consisting of seven to thirteen leaflets attached to a central, often reddish, stalk Dermatitis from this plant is clinically far less important than that from the others (4) Rhus vernicifera, another plant in this group grows in Japan and China It is of significance to us because its dried sap is present in articles imported from the Orient, such as mah jong sets, ear phones, wooden ornaments wooden bracelets, and broaches The excitant agent is the same in all plants and reacts in the same manner allergically and immunologically Immunization and desensitization with ivy extract is equally efficacious in cases of poisoning from all four species The active principle producing dermatitis is not an oil, as previously thought but a dialyzable fraction of an oleoresin which is soluble in water

Mode of Contact Some individuals believe they are so sensitive to poison ivy that merely being in its proximity will develop a lesion, although they do not touch the plant This theory has been proven incorrect, as

actual contact with the sap of the plant must be established Howell[85] has shown that smoke from the burning plant, as a rule, does not exude the active ingredients in vapor form Only when windborne particles containing the toxic sap are released from the burned plant do eruptions occur on the parts of the skin which are exposed to it There is, of course, the possibility of indirect contact with the plant sap This occurs when the material is stuck to clothes, dogs or other animals, to udders of cows, to tools, golf clubs, to soft balls, to fishing tackle, door knobs, and even to insects Changing a tire contaminated with the sap may be the source of a lesion The dry sap adhering to such objects can retain its potency for many months It can be readily removed by a solvent such as a cleaning fluid In the plant the sap is present in the stem and in the leaves Other parts are not antigenic unless they are contaminated with the sap The plant is most poisonous when it contains the most sap, namely in spring and early summer More patients are contaminated in the summer time because there is more activity in woods and fields than in winter

The serous fluid contained in poison ivy lesions does not transmit the active ingredient Scratching these areas, however, can propagate the sap which has been adhering to the skin Thus new lesions can occur elsewhere during the course of the disease The genital areas are a favorite localization of poison ivy from contamination at the toilet

Clinical Aspect. The severity of the eruption is determined by the degree of the sensitivity of the patient and by the amount of the skin area which has had contact with the plant Cases are described in the literature which were so severe that visual disturbances, delirium, and even death followed the exposure to poison ivy

If there is frequent and extensive exposure to the plant, the lesions may last throughout the first summer Sooner or later a perennial condition is liable to develop persisting throughout the winter months Acute flares occur during the growing season of the plant, or through contact with other agents to which secondary sensitivity has developed

Chewing the poison ivy leaves will induce an eruption of the mucous *membranes on lips, mouth, and the gastro-intestinal tract In general,* however, the mucous membranes are less susceptible than the skin In addition to the typical poison ivy eruption there is what is called a "toxic" form of lesion which is liable to occur in nonsensitive persons as well shortly after contact with the milky juice of the mature plant The skin immediately turns white and later, after oxidation of the juice, black An eschar may form which sloughs off in from eight to eleven days, leaving a slight scar This caustic effect of the juice has also been observed in experimental animals *

* For treatment of ivy poisoning see Chapter X

Protection from Poison Ivy. A person known to be susceptible to poison ivy should be taught to recognize the plant in order to be able to avoid contact with it He should also be made aware of the fact that poison ivy sap is apt to adhere to such objects as lawnmowers, garments, socks, golf balls, fishing tackle, tires, and animals

Eradication of poison ivy in an infested area is now relatively easy by the use of ammonium sulfamate, or of 2-4 dichlorophenoxy acetic acid (2-4D)* After a poison ivy plant has been killed by spraying, it retains the poisonous resin for several months It should therefore be handled with gloves

If a person has been exposed to the plant, an effort should be made to remove the resin of the plant from the surface of the skin as soon as possible by thoroughly washing and rinsing with soap Strongly alkaline soaps serve this purpose best Special attention should be given to the exposed parts of the body, neck, arms, hands, fingernails, and webs between the fingers, as well as the lower portions of the legs and the genital areas, which become contaminated through the hands After washing, these parts should be thoroughly scrubbed with alcohol in order to dissolve any remaining particles of poison ivy sap The sooner after exposure to the plant and the more thoroughly the cleansing of the skin is carried out, the more likely it is that the disease will be prevented

After the eruption of the lesions oily ointments should be carefully avoided in the initial state, since they dissolve and further spread the poison resin Transmission of harmful material to other parts of the skin explains why new lesions continue to arise for several weeks after exposure to the plant when patients fail to thoroughly cleanse the skin

Plant Dermatitis

While most studies on plant dermatitis have been carried out on poison ivy, oak, and sumac, many other plants have been reported as causes of dermatitis Lesions resulting from these plants are identical with those of poison ivy in every respect Because of their varying content of oils, fats, and alkaloids, some plants are much more capable of sensitizing the skin than others Even an individual plant is subject to seasonal variations in its sensitizing ability because of varying amounts of sap present at different times of the year The excitant oils are present in leaves, stems, roots, and in the pollen

Shelmire[162] routinely tests with oils from the fifty six different plants noted in Table VIII In this group parthenium, bitterweed (dog fennel), burweed marsh elder, and giant and short ragweed are clinically most im-

* See Appendix II Control of Poison Ivy

TABLE VIII

SHELMIRE'S LIST OF PLANTS FOR PATCH TESTS

Scientific Name	*Common Name*
Centaurea americana	American thistle sultana star thistle
Aster multiflorus	Many flowered aster
Cynodon dactylon	Bermuda grass
Helenium tenuifolium	Bitterweed fennel yellow dog fennel
Rudbeckia hirta	Black eyed susan niggerhead
Amphiachyris dracunculoides	Broomweed
Diodia teres	Rough buttonweed
Croton capitatus	
Kallstroemia maxima	
Eupatorium serotinum	
Xanthium speciosum	
Melilotus alba	
Froelichia floridana	
Synthenisma sanguinalis	
Croton monanthogynus	Single fruited croton
Lespedeza frutescens	Bush clover
Heterotheca subaxillaris	
Erigeron philadelphicus	
Ambrosia trifida	
Rumex crispus	
Iva angustifolia	
Thelesperma gracile	False coreopsis
Solidago serotina	Late goldenrod
Marrubium vulgare	Horehound houndsbene
Monarda punctata	Horsemint perennial sandyland sage
Acuan illinoensis	Illinois mimosa
Gaillardia pulchella	Indian blanket showy gaillardia
Vernonia baldwinii	Ironweed
Chenopodium botrys	Jerusalem oak feather geranium
Sorghum halepense	
Chenopodium album	
Gaura parviflora	
Leptilon canadense	
Iva ciliata	
Asclepiodora viridis	
Cassia chamaecrista	
Amaranthus blitoides	
Parthenium hysterophorus	
Amaranthus retroflexus	
Cycloloma atriplicifolium	
Prionopsis ciliata	Prionopsis
Helenium microcephalum	Sneezeweed
Solanum elaeagnifolium	Silver leaved nightshade
Aster exilis	Slim aster
Euphorbia marginata	Snow-on the mountain
Ambrosia elatior	Short ragweed wild tansy
Hartmannia speciosa	Showy primrose
Helianthus annuus	Common sunflower
Acnida tamariscina	*Western water hemp*
Lactuca ludoviciana	Wild lettuce western lettuce
Artemisia mexicana	Wormwood Mexican mugwort
Verbena officinalis	Wild verbena European vervain
[illegible]	Yarrow, milfoil Thousand leaf
[illegible]	rairie false boneset
[illegible]	ussian thistle saltwort windwitch
[illegible]	yrethrum

portant Cocklebur and sneezeweed are less frequent offenders, while hackberry tree, Amoor privet hedge, cotton, Shasta daisy, sorghum cane, Forney hay, and Sudan grass are decidedly less common sources

Certain individuals are more susceptible than others to the development of contact sensitization to these plants This predisposition is undoubtedly determined by the frequency of previous exposures to the plant and by the duration of the individual s contact with it

Since contact with plants and their products predominates in certain occupations, the problem of plant dermatitis is closely linked with that of occupational dermatitis Nursery men, packers, and sorters of flower bulbs, for instance, develop so called "tulip fingers" from handling the bulbs of tulips, hyacinths, narcissus, and daffodils These lesions show a pattern of the finger grip type It is estimated that from 30 to 50 per cent of gardeners are sensitive to the sap and pollen of primroses Other offenders in gardeners are bleeding hearts, morning glories, larkspur, begonias, geraniums, prickly pears, gaillardia, cow parsnips, orris root, privet, oleander, dwarf laurel, and clematis Among florists sensitivity to chrysanthemums is the most important source of dermatitis Chrysanthemum dermatitis is readily recognized if we bear in mind its seasonal appearance in late fall Less common are lesions from asters, marigolds and gaillardias, which bloom in late summer and fall In any of these cases traumatic lesions from pricks, cuts, and scratches, secondary infections, insect bites, and fungous infections must be differentiated from a true contact dermatitis

In foresters, we observe sensitivity to birch, oak, beech, chestnut, acacia, and to pine, cedar, spruce, and other evergreens, the sap of which is especially prone to sensitize the skin Farmers may be contact sensitive to any of the weeds mentioned above in Shelmire's tabulation In my experience ragweed is by far the most common offender among farmers Dermatitis due to corn, hops, and sunflower is observed much less frequently

Sensitivity to certain plants is frequently carried over into other occupations not directly concerned with the handling of the plant, but with its products Carpenters may be sensitive to certain kinds of woods and to saw dust Woodcutters lumberyard workers, and hunters may develop dermatitis from the same sources Wood from the California sequoia has caused dermatitis in ship builders,[156] silver spruce, in airplane factory workers Furniture workers have been found sensitive to mahogany wood, flute players, to the Cocus wood from which their instruments are made, housewives, to cocobolo wood of the handles of tableware Some authorities believe that free, unsaturated acids in the various woods, rather than the resinous oils and alkaloids are the toxic agents

Most vegetables, fruits, and cereals have been recorded as sensitizing agents Food handlers experience sensitization, especially to celery and horseradish Lettuce, spinach, carrots, cinnamon, oil of cloves, and vanilla are other causes to be mentioned here Dermatitis occurred from the juice of the plant in one third of a group of sixty individuals weeding a field of parsnips [156] In contact sensitivity to foods, we should be aware of the fact that the food itself is not always responsible for the lesion Insect sprays, disinfectants, coloring matter (on citrus fruits), and other chemicals from wrapping and packaging the food (colored paper) are often the sensitizing agents

Finally, in discussing plant dermatitis, we should note that many drugs, resins, and vegetable dyes which are widely used in industry are the active principles of plants causing dermatitis Thus, the eruptions are seen in various other occupations and trades, the elucidation of which is not a part of the problem of plant dermatitis

Dermatitis from Pollen

Dermatitis from pollen is another type of plant dermatitis Its mechanism resembles closely that of poison ivy The coating surrounding the pollen grain contains the noxious substance, a resin-like material Pollen dermatitis is probably much more prevalent than is generally appreciated by clinicians It occurs mostly in individuals working outdoors who have contact with pollen containing plants, such as farmers, gardeners, and carpenters Other persons can become affected through the presence of pollen in the air Because of the ubiquitous distribution of the pollen grain, which is carried by the wind for hundreds of miles, it probably plays a foremost part in aggravating and prolonging the duration of dermatitis due primarily to other sources Its seasonal appearance is often camouflaged, inasmuch as sensitivity to secondary causes and infection tends to prolong the duration of the lesions long past the termination of the pollen season In this respect, pollen dermatitis resembles other allergic manifestations, such as pollen asthma or allergic nasal disease, which are initiated by pollen but do not subside at the end of the season

Site: The principal localizations of a pollen dermatitis are the exposed parts of the body, namely, face, eyes, arms, and lower legs Where the skin is covered by clothing, the lesions are well delineated In farmers, for instance, their borders form a V-shaped line on the neck, reaching down to the chest, because the shirt is worn unbuttoned I have seen limited patchy lesions due to pollen on fingers, and on the dorsal surfaces of the hands, as well as dermatitis on the eyelids

Lesions: The lesions of pollen dermatitis are generally less acute than

those from poison ivy, because of the more prolonged contact of pollen with the skin Papules and vesicles can often be noted on the skin on areas to which individual pollen grains have adhered Duke[40a] produced rag weed dermatitis in an experimental subject, contact sensitive to ragweed, by applying the dry pollen to the arm At first each grain gave rise to an individual papule, during the healing phase, these lesions became confluent and thus gave way to an evenly distributed eruption

Relation to Atopic Lesions Some clinicians distinguish clinically between a contact and an atopic type of pollen dermatitis The former is due to the fat fraction of the pollen grain, the latter is believed to be induced by its water soluble fraction In atopic lesions the antigen reaches the skin through the blood stream after it is inhaled and absorbed through the mucous membranes of the nose, sinuses, and bronchi Contact dermatitis, on the other hand, is due to direct action of the pollen on the epidermis *The contact lesion is treated in a manner similar to that of poison* ivy dermatitis, namely, by injections of the oil extract, whereas, for the atopic lesion, the usual method of desensitization with the water soluble extract is employed in the same manner as in the treatment of hay fever

While such a clear differentiation is basically warranted and should be adopted in the management of our patients, it can readily be ascertained that many atopic lesions of dermatitis are aggravated considerably by direct contact of the pollen during the season Moreover, in my experience, oil extracts have been very effective in the treatment of atopic lesions, and vice versa, aqueous solution, in contact dermatitis Indeed, I have observed local reactions two to three days after the performance of intradermal tests with aqueous pollen extracts They resulted in the development of eruptions with typical papulo vesicular lesions indistinguishable from contact dermatitis

Season The most characteristic feature of a pollen dermatitis is its seasonal appearance A new outbreak or the flare up of an existing dermatitis can occur so regularly on a certain day of the year that the causative diagnosis can be made without other diagnostic aid Many of these patients come to the office seeking relief exactly at the same date when the hay fever patients start to sneeze In the eastern and mid western states we can identify certain days of the year with the presence of certain pollen *in the air*, namely, Decoration Day, with June grass, July 4 with timothy, Easter, with the pollination of certain trees, and Labor Day, with ragweed

Which Pollen In inquiring into which pollen is responsible for a dermatitis, we should bear in mind that insect-borne pollens are not propagated by the wind and do not drop more than a few feet from the plant They are the pollens of all flowering plants (including roses, goldenrod, and chrysanthemums) The lesions from flowering plants, therefore, are con

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and other cosmetics in jars may be contaminated by nail polish or dyes which are present on the fingers Particles of machine oil, cleaning solvents, other chemicals used in the process of manufacturing, and even faulty techniques in packaging the material are responsible Some cosmetics deteriorate because of age, continued exposure to light and poor storage This leads to the production of irritants or potential sensitizing agents Furthermore, objects employed in applying the cosmetic to the patient's skin must be considered as possible causes For instance, it may not be the face powder, but the rubber, wool, cotton, nylon and dyes present in the powder puff which is the sensitizing agent Nickel tweezers rather than the eyebrow pencil can cause lesions in the area of the eyebrows Hair nets and hair pins, not the hair setting fluid, can be responsible for lesions Plucking of eyelashes followed by application of an eyelash preparation has led to a fatal infection described by Forbes and Blate [50]

As fashions change, the chemical composition of cosmetics undergoes changes as well Of the various cosmetics, fingernail polish is the most common source of dermatitis Nitro cellulose in conjunction with synthetic resins which give it the indelible quality are the offending ingredients Occasionally bottle closers and applicators, rather than the nail lacquer itself, contain the sensitizing agents Nail polish removers containing various oils dissolved in ethyl acetate may be responsible The favorite localization of nail polish dermatitis is not the fingers, but the eyelids, the lateral parts of the neck, cheeks, ears, ear canals, shoulders, and chest, and sometimes even the anogenital regions These areas are irritated by the polish on the fingernails from touching, rubbing, or scratching A nail polish dermatitis can often be distinguished by its patchy, erythematosquamous appearance

The most dangerous types of cosmetics are those used in the process of hair dyeing, metallic salts (lead copper, silver, iron) and anilin dyes, which are ingredients of these preparations, are especially harmful Vegetable dyes, such as henna, indigo, and walnut, are other damaging components Secondary infections are not uncommon, and even death has been reported in extremely sensitive cases No one should permit her hair to be dyed without careful preliminary patch testing If the dye has been used before without ill effect, subsequent applications may, nevertheless, be dangerous, as the individual may have become sensitized to it in the interim

Probably the least harmful cosmetics are face powders Contact sensitivity rarely occurs If it does, it is usually due to the presence of pigments (coal tar dyes) which are used to give the powder the desired shade Powders may also contain gum acacia as a binder Eyebrow pencils contain mascara or coal tar products In lipstick indelible dyes (bromfluorescein) or perfumes are the offending ingredients Cheilitis is not infre-

quently a part of the clinical picture of lipstick dermatitis Severe urticaria has also been reported to be associated with it Most manufacturers of lipsticks supply patch test sets to physicians which contain all ingredients of lipstick Orris root is no longer used in many proprietary cosmetics, since it is recognized as one of the chief causes of respiratory allergy.

Schwartz and Peck[1 3] presented an analysis of the principal sensitizers of each type of cosmetic, which is the basis for Table IX.

An interesting situation exists with reference to certain perfumes containing Bergamot oil These ethereal oils are dissolved by the sweat, thus releasing a photosensitizing substance If the affected areas are subsequently exposed to light, pigmentation develops which may be an annoying symptom to the patient for weeks and months after the discontinuance of the perfume

In men, the two cosmetics which are the most frequent sources of contact dermatitis are hair tonics and after-shaving lotions In the latter, perfumes are the responsible ingredients in hair tonics, gums and resins Men are susceptible to dermatitis from contact with women's cosmetics I have seen several newlywed couples who were forced to discontinue their honeymoon becauses the bridegroom suffered severely from dermatitis from his bride's cosmetics One man manifested an urticaria accompanied by a dermatitis on the arm The urticaria flared up whenever he placed his arm on his wife's neck Another patient had lesions about lips, eyes, and cheeks from his wife's lipstick A third presented an acute dermatitis involving the whole right side of the trunk from a perfume worn by his bride How difficult these problems are is indicated by the fact that this patient was referred to me for skin testing by a physician who suspected the dust in an overnight cabin as the offending agent The popular notion that a man can become sensitive to his wife is usually based on a sensitivity to the woman's cosmetics However, a person may be sensitive to another individual's skin dander, as has been reported by Simon[165]

Control of Dermatitis from Cosmetics: In controlling dermatitis from cosmetics, the patient should be advised that a powder puff, tweezers, and other articles employed by beauticians, rather than the cosmetic itself can cause the lesion, nail polish remover rather than nail polish, an after-shaving lotion rather than a shaving soap or cream may be the responsible agent Moreover, precautionary measures should be taken regarding cosmetics used by the patient's husband or wife In atopic eczema in young children, contact with the mother's cosmetics and with her dandruff must be prevented

For some cosmetics there are appropriate substitutes· a shaving cream or shaving soap can be replaced by dry shaving powders or an electric razor; a scented or colored face powder, by one which is free from per-

TABLE IX

SENSITIZERS AND IRRITANTS IN COSMETICS*

	Sensitizers	*Irritants*
Face Powder	Magnesium oxide starch orris root metallic lakes of aniline dyes undecylic salts tragacanth gum	
Lipstick	Beeswax castor oil cocoa butter lanolin paraffin liquified petroleum jelly tetrabromo fluorescein bromo acid dibromofluorescein	
Nail Polish	Nitrocellulose estergum glycolether formaldehyde resins ethyl acetate toluene butyl acetate amyl acetate dibutyl phthalate copal castor oil phenolic resins, polyvinyl alcohol resins methyl ethyl ketone vinylite camphor santolyte M S alkyd resins beeswax methacrylate resins	Acetone amylacetate ethyl acetate
Hair Dyes Bleaches and Rinses	Henna walnut leaves indigo chamomile camomile nickel *ammonium sulphate* pyrogallic acid paraphenylenediamine para toluene diamine aniline dyes alizarin amidol benzoyl peroxide Brazil wood oxalic acid	Ammonia ammonium bisulphite ammonium carbonate potassium disulphite
Hair Tonics	Castor oil salicylic acid cocoa butter lanoline chloral hydrate bergamot cantharides *resorcin* bay oil quinine resorcinol chlorothymol arsenic bay rum bayberry karaya gum betanaphthol	Betanaphthol cantharides
Wave Preparations	Maleic anhydride resins karaya gum acacia tragacanth *maleic acid* ethanolamines morpholine sodium persulphate	Ethylene diamine potassium disulphide sodium carbonate sodium stannate zinc ammonium chloride
Deodorants	Ammonium *sulphide*	Aluminum chloride aluminum sulphate zinc formate zinc salicylate zinc sulphate
Depilatory	Ammonium sulphide	Sodium sulphide potassium sulphide cadmium hydrosulphide calcium sulphide calcium thioglycolate
Perfumes	Linalool cassia oil lavender oil orange oil pinene tangerine oil terpinol lemon oil lime oil orris oil, bitter almond oil ihlang ihlang bergamot oil synthetic jasine *methyl heptine carbonate* olibanum *tuberose oil* neroli oil *limonene* jasmine oil vanilla hyacinth oil *geraniol* citral aldehydes angelica oil clove oil *arnica flowers* Canada balsam essential oils benzyl benzoate eugenol jonquil oil citronella oil cedarwood oil diethyl phthalate	Citronella oil, essential oils *lime oil limonene*
Preservatives	Salicylic acid orthophenyl phenol formaldehyde cresol amyl metacresol carbolic acid chlorocarvacrol phenyl mercuric salts chlorothymol mercuric compounds	Cresol amyl metacresol carbolic acid chlorocarvacrol salicylic acid orthophenyl phenol formaldehyde mercuric compounds and salts chlorothymol
Creams	Benzoic acid benzoin lanolin resins natural waxes	
Antiseptic	Carvacrol resorcinol	Carvacrol thymol resorcinol
Shampoo	Coconut oil linseed oil	

* Compiled from Schwartz and Peck [39] and Schwartz and Tulipan [134]

fumes or dyes Most so called non-allergic cosmetics are free from orris root, the inhalation of which is damaging to patients with respiratory allergy They do, however, contain substances which may produce contact dermatitis There is a large variety of non-allergic soaps which are preferable to ordinary ones They should, however, be employed judiciously by a patient with contact dermatitis because some lesions are subject to irritation from any soap or detergent

Soaps

Soap dermatitis occurs mainly in persons with a tendency to a sensitive skin or in individuals who through their occupation or otherwise have frequent contact with soaps This includes domestic servants, dishwashers, laundresses housewives and surgeons Furthermore soaps are likely to aggravate practically any kind of dermatitis no matter what its original cause may be

The soap molecule is composed of a fatty acid constituent which is oil soluble and of an alkaline water soluble part Both are liable to produce irritation of the skin The alkaline part softens and dissolves the protective keratin layers of the skin An acid mantle should therefore be preserved by keeping the p h of soaps on the acid side The oil soluble part tends to remove the protective oils and fats which are physiologically present in the skin Potassium soaps are known to irritate the skin more than sodium soaps, soaps made from coconut oil containing saturated fatty acids of low molecular weight, are more harmful to the skin than those made from tallow or olive oil Whereas the irritant action of soap is due to alkali or fatty acids true sensitivity is usually attributed to coloring matter, perfumes and medications which are present in the soap If soap is applied to the skin as a patch test for 24 hours a reaction from its irritating effect occurs in practically every person In order to determine sensitivity to a soap it must be diluted sufficiently so as not to irritate the normal skin A 1 to 2% aqueous solution is adequate for this purpose

Laundry not thoroughly rinsed free of soap can induce contact dermatitis, *i e*, on the buttocks from children's panties or on the cheeks from pillows So called non-allergic soaps* are much less irritating, but are not entirely free from sensitizing action

Dermatitis from Wearing Apparel

The majority of patients with contact dermatitis from a dress, a suit, or other articles of clothing are sensitive to dyes or other chemicals em-

* The following are so called non allergic soaps Hazeline soap Basis soap Dermolate soap, Laco Castile soap and Lowila soap

ployed in finishing the goods Contact sensitivity to such fabrics as silk, cotton, wool, and nylon is much less common This is in contrast with the important part which these materials play in an atopic sensitization, especially in respiratory allergy and in atopic eczema

Finishing Products Fabrics undergo many processes and chemical treatments before they are finished and ready for use The various purposes of the finishing processes are softening the fibers, diminishing a lustre, rendering a fabric partially waterproof, or improving the texture and appearance of the material Women's hosiery, for instance, are rendered waterproof by treatment with starches, gums, gelatins, Japan wax, paraffin and other waxes, some of which are known to be strong skin sensitizing agents Zinc sulphate, barium sulphate, and aluminum sulphate, diminish the lustre of materials Sulphonated oils, olive oil used alone or mixed with mineral oil, are employed to finish men's socks Schwartz [161] has shown that dermatitis from socks can be avoided by thoroughly washing the new socks and thus removing the sources of irritation The same has been noted in womens' hose, where synthetic resins have been employed in sizing the materials

Dyes. When a dye is responsible for a dermatitis it usually comes off the fabric and can be seen on the skin It is said to 'bleed' However it is not always the dye itself that causes the lesion Various other chemicals are employed in the process of dyeing, which, when used in excess or combined in the wrong proportion with others, can give rise to dermatitis

Effect of Perspiration: The harmful effect of perspiration is generally recognized According to different authors, the hydrogen ion concentration of human sweat varies from ph 4 2 to 7 5 It is more acid after work and in warm weather The degree of acidity of perspiration fluid varies on different parts of the body in the same person Some dyes are more readily dissolved by acid than by alkaline perspirations, which accounts for the diverse response of different parts of the skin to contact with a dye Other dyes are harmful because of their fat-solubility A high fat content of the perspiration fluid will, therefore, dissolve them, whereas, perspiration from other parts of the body where the skin shows little sebaceous secretion will have no such effect

Other Sources Occasionally a dress dermatitis may be accounted for by cleaning fluids and moth sprays Contamination of clothes by oil, grease, cement, fertilizer, insect sprays, and other agents with which men have contact in their daily work are other sources Furthermore, the many accessories to clothing can cause lesions limited to certain areas of the body They include shoulder pads, dress shields collars of various materials, zippers, shoulder straps, studs, buttons, and dyed dress labels and articles carried in pockets The fact that some garments contain inlaid patches of different colors and materials is another reason for the occur-

rence of circumscribed lesions on various parts of the body. Gloves with leather inlays, and socks with borders or stripes of different colors may be mentioned here

Women. Dress dermatitis is mostly seen in the middle aged, overweight woman who is more subject to perspiration in the folds of the body This condition is often complicated by furuncles and small abscesses in the axillary sweat glands or by seborrhea of the scalp Brown and black dresses, the latter containing paraphenylenediamine, are the principal causes in this group Garments which are worn tightly on the skin, especially women's foundation garments, are other important sources of dermatitis The present vogue of wearing black undergarments has increased the incidence of these lesions Once a patient has become sensitive to a black dye, multiple sensitization to other dyes, shades, and colors may arise This can become a very serious problem to a woman in selecting her wardrobe

Men In men, dermatitis from clothing is not as acute as in women The lesions are more chronic, scaly, somewhat lichenified and infiltrated, and manifest less vesiculation They may persist for weeks after the damaging clothes have been discarded In recent years, we encountered a relatively large number of cases of dermatitis among young individuals because of their tendency to wear loudly colored shirts

Fur Dermatitis: In fur dermatitis sensitivity may be caused by the pelt itself, or by chemicals used in dressing, tanning, and dyeing The dyes and mordants which are applied to the hair are the chief sources of fur dermatitis The non hairy side of the pelt is covered by a lining and therefore does not affect the skin Dermatitis from furs is particularly apt to occur when the poorly applied dyes come off and dissolve in the skin secretions In other words, thoroughness and care during the processing of a fur, especially sufficient washing, oxidizing and drumming, will aid in the prevention of this condition Indeed considering the millions of people wearing dyed furs, the number of patients with fur dermatitis is very small

Medico Legal. In discussing the medico legal aspect in dermatitis from wearing apparel, many patients attempt to sue the manufacturer of a garment for damage, blaming a dye for the eruption In the majority of these legal suits, the patient's individual sensitivity to either the material or the chemical is responsible and it is easy to establish that the item in question is harmless to normal individuals If the claimant can prove that the garment has been dyed by a faulty process or with chemicals not in common use, and that normal individuals have also been affected by it, the manufacturer or merchant may be held responsible

Control of Dermatitis from Wearing Apparel Discarding a garment which has been found responsible for a lesion usually presents no prob-

lem It may not be easy however, to select a suitable coat, suit or dress if the patient with chronic lesions suffers from multiple sensitivity to various dyes Other complications arise if contact sensitivity is associated with atopic sensitivity in a person allergic to silk, wool, cotton or nylon Some of these patients can be relieved by systematic desensitization with extracts of these fabrics An attempt at desensitization therapy against dyes and other harmful chemicals would, of course, be dangerous It might be possible to eliminate an irritating part of the garment by replacing it with a non irritating one

A coat may be relined, a ribbon around the head may be substituted for a hair net, a black foundation garment can be replaced by one with a harmless dye It is possible to use a white scarf made of cotton instead of a dyed one made of a more irritating fabric A white scarf also affords protection to the neck from friction with the collar of a coat or blouse A leather hatband can be eliminated or replaced by an undyed one made of cloth On arms and other parts of the body, bandages may be used temporarily A white shirt protects the body surface from contact with rubber, dyes, silk, and other materials in corsets and undergarments If the patient is sensitive to a black dye, all garments which are black and brown should be avoided In fact, any article with bright colors should be withheld from the skin because these patients are often sensitive to many dyes unrelated chemically to each other Nylon stockings, socks, and certain undergarments should be rinsed thoroughly in hot water before they are worn, in order to remove the irritating finish

Dermatitis from Footwear

Footwear deserves special attention in this discussion because it is the chief source of dermatitis of the feet Some eruptions from footwear are often mistakenly attributed to infection especially to epidermatophytosis

Causes Recent contributions by Underwood and Gaul[85] have shed a great deal of light on this subject Contrary to the general belief, dermatitis of footwear is not caused by ingredients of leather alone, but by a wide variety of synthetic materials, especially leather dyes and adhesives The number of these items is said to reach into thousands, they are present in innersoles, the inner leather linings, canvas, fabrikord, stockings, tennis shoes, felt, and tape, others are constituents of dyes (brown, black, white, and others), as well as polishes, metal and plastic trimming and fur lining of galoshes Table X presents a listing of inciting agents as noted by Underwood and Gaul in their series of 160 cases

Predisposing Factors There are several reasons why the foot is such a favorite site for the development of a dermatitis The thick epidermal

TABLE X

MATERIALS RESPONSIBLE FOR SHOE LEATHER DERMATITIS
(In 160 patients according to Underwood and Gaul[44])

Shoe Materials	Number of Cases	
	Acting as Primary Irritants	*Acting as Sensitizers*
Fabric and rubber toe box	6	4
Felt and asphalt toe box	9	12
Leather cemented toe box	2	
Rubber braid	1	
Black shoe polish	1	
Leather insole (asphalt filler)	3	9
Leather insole (plastic filler)	1	
Leather insole (rubber filler)		1
Coated lining (paper cloth leather)	3	30
Coated heel pad	2	
Rubber lining	2	8
Fabric insole (rubber filler)	1	1
Cemented lining (cloth leather)	10	25
Sponge rubber (fillers arch pads)	23	1
Rubber cement		2
Rubber welt		1
Felt		2
	64	96

covering of the soles is punctured by innumerable sweat pores These pores communicate with the intercellular lymph spaces of the epidermis and thus provide an entrance for volatile, fat, and water-soluble irritants Sweating on the feet is practically continuous The perspiration tends to extract the chemicals from the shoes and the extracts soak into the secretion of the foot The interdigital webs where the skin is thin and delicate is particularly susceptible to irritation from these materials Friction and rubbing between the foot and shoe, as well as intermittent or sustained pressure, is practically continuous The daily duration of contact amounts to from 12 to 16 hours In many instances this contact persists for months or even years Thus the exposure to the damaging agents is more protracted than in most other cases of dermatitis Edema fluid from the lesions gravitates into the most dependent portion of the foot This further enhances the intimacy of contact with offending materials and favors the production of new lesions on sites not previously touched by the agent Such mishaps as getting the shoes wet from rain or spilling water on them further aggravate the situation Besides the sensitizing effect by some of the chemicals involved, there is an added toxic action from certain oily substances present in footwear This results in a temporary paralysis of capillary blood vessels leading to a brilliant erythema of the skin The lesions on the foot can also initiate a dermatitis on the hands, either through direct contact with the offending footwear, or through secondary contact from scratching the affected areas on the feet Some-

times a shoe leather dermatitis is associated with lesions elsewhere if synthetic rubber in garter snaps elastic and adhesive plaster in contact with other parts of the skin is the offender

Patterns Most patterns of dermatitis on the foot are symmetrical well delineated A common pattern of dermatitis from footwear is localized on the plantar surface of the instep This is caused by the padding of arch supporters It can often be controlled by having this part of the shoe covered by a layer of a waterproof material (oiled silk) The sites of other lesions are the top of the great and little toe where there is pressure from the shoe where the tongue of the shoe has contact with the foot where straps cross the ankles There are lesions encircling the lateral portions of the foot where loafers" or sandals are in contact with the skin If the eruption reaches up to the lower third of the leg the dyes of socks oils cement and other chemicals should be suspected

Differentiation from Epidermophytosis Epidermophytosis on the feet can be distinguished from a contact dermatitis because it always starts between the toes and the skin remains most irritated in these spaces The macerated scales and fissures with their characteristic odors are diagnostic of epidermophytosis Drug eruptions on the other hand such as those from barbiturates are usually localized on the plantar surface of the feet

Goodman and Sulzberger[63] established the following criteria for differentiating a shoe leather dermatitis from epidermatophytosis 1) In shoe leather dermatitis there is usually little or no involvement of the interdigital spaces 2) The opposing lateral surfaces between the toes are usually not involved 3) The involvement on the tops of the toes particularly on the great toes is characteristic of shoe leather dermatitis 4) The maximal eruption occurs at the sites of maximum pressure or friction 5) The lesions of shoe leather dermatitis are usually well demarcated at the margins of the shoes 6) *Previous treatment for a dermatophytosis* had been unsatisfactory 7) Itching is more severe than in an uncomplicated dermatophytosis

In shoe leather dermatitis two layers of wax paper placed inside of the shoes are often adequate to prevent contact of the skin with the sensitizing material *Should this not be the case the inside of the shoe may be lined* with oiled silk If neither one of these measures prove satisfactory the shoes may have to be abandoned

Dermatitis from Adhesive Tape

Dermatitis from adhesive tape can easily be diagnosed because of the sharp demarcation of the lesions and because of the history given to us by the patient that tape had been applied in the affected area Sometimes

the question arises as to whether an eruption is due to true sensitivity or whether it resulted from mechanical irritation, maceration, and bacterial infection

Gaul and Underwood[29] found that a more-or-less pronounced irritation occurs in practically all patients who apply adhesive tape They observed only six severe cases of dermatitis among 763 individuals who had been exposed purposely to over 5,000 applications of two or three brands of adhesive tape The six cases presented pustular eczematization under the tape with surrounding flare reactions In one individual the entire arm was involved, and other areas of the skin previously exposed to adhesive tape had flared up simultaneously It is of interest that all six cases occurred in middle aged women Among older individuals the skin was less susceptible Hot and humid weather enhances the incidence of irritation

True dermatitis can be distinguished from an eruption due to mechanical trauma by the fact that it shows a tendency to exfoliate, while the traumatic lesions heal by primary scabbing The traumatic reaction is brought about by pulling hair out of the skin when the tape is removed A dermatitis, on the other hand, shows an erythema associated with macules and papules It has the characteristic appearance of other contact lesions For the first eruption an incubation period of five or more days is required, second and third applications produce the lesions within a period of 24 hours Even before the tape is removed, a slight edema involving the surrounding skin area can often be seen and scratch marks are noted around it Within a few minutes following the removal of the tape and exposure of the skin to air, erythema appears around the hair follicles and edema pushes out of the follicles, giving the skin the appearance of a field of shocked grain

According to Gaul and Underwood, rubber is the most important source of dermatitis from adhesive plaster In addition, resins, gums, and various kinds of pharmaceuticals and disinfectants may be present in the tape The theory has been advanced that in eruptions from adhesive tape the presence of bacteria on the surface of the skin might play the principal part Adhesive tapes have, therefore, been devised through addition of fatty acids to alter the ph of the skin, and to decrease the bacterial flora on the skin underneath the adhesive plaster This procedure has not been proven to be of value

As pointed out before, in the performance of patch tests, sensitivity to adhesive tape must be taken into account Very unpleasant irritations are not uncommon, and true contact sensitization in subjects with other lesions of dermatitis is undoubtedly found more often than indicated by the observations of Gaul and Underwood on normal subjects

Occupational Dermatitis

Incidence and Causes: According to Schwartz, occupational dermatoses affect about 1 per cent of all industrial workers Approximately 20 per cent of these cases occur in metal and machinery workers Domestic help and workers in the food industry constitute the next largest group Schwartz considers the following items the principal causes of occupational dermatitis petroleum oils and greases, alkalis (including cement and concrete), solvents, chromic acid and salts, metals and metal plating, dyes, plants, rubber and its compounds, paints and varnishes, and synthetic resins

Skin Irritation and Contact Sensitization: In evaluating a case of industrial dermatitis, we must again carefully distinguish between the irritant and the sensitizing action of the responsible agent Only about 20% of the cases of occupational dermatitis are said to be due to true sensitization, the remainder to primary irritants (Weinberger[207a]) Substances conspicuous for their caustic or irritating effect on the skin are strong acids, alkalis, metallic salts, and certain solvents especially those of low boiling range In addition, there are skin eruptions in industry which do not come under the heading of dermatitis such as ulceration from chromic acid, or acneiform eruptions from mineral oil or bromides, iodides and chlorinated compounds Mechanical agents can produce calluses, cuts, and abrasions, which may become chronic through subsequent infection with bacteria and fungi Burns caused by electricity, radium, Roentgen ray, and pernio from cold are other conditions which must be differentiated from contact dermatitis

Predisposing Factors: Any of these lesions may become predisposing factors in the development of contact sensitivity Lack of cleanliness, excessive perspiration, continued exposure to water and to hot and cold temperature may further enhance the susceptibility of an individual to contact dermatitis Patient's with ringworm infection are believed to be more inclined to develop industrial dermatitis Some industrial lesions have been linked *with a decrease in the resistance of the skin to alkalis, especially to soaps* If a soap dermatitis develops, it may occasionally form the basis for secondary contact sensitization from other sources

Diagnosis: The lesions may be acute and of comparatively short duration due to a single exposure, or they may show the characteristic features of a chronic process with thickening of the skin, scaling, and crusting In our effort to determine whether or not a dermatitis is of industrial origin, we must realize that the onset of the eruption does not always correlate with the beginning of work, with a change to a new type of work, or with new working habits The lesion may develop so gradually as to go

entirely unnoticed For instance, a painter may have been working with turpentine for weeks and months before he gradually develops a dermatitis from it

With some chemicals a highly confusing situation prevails the eruption does not start at the area in contact with the object, but appears as noted in dermatitis from fingernail polish, with vague itching in the eyelids or on the wrists, gradually increasing to a severe eruption Therefore, a very careful and exact description of the patient's working tools, of the individual's actions at work, his working habits, and his working clothes, is required for establishing a solution to the problem In the majority of lesions of industrial dermatitis there are characteristic patterns which suggest the object causing them

A careful exploration of the articles handled is necessary For instance, in dermatitis of cigar makers, not the tobacco, but the insecticide *sprayed on the growing tobacco or the paste employed on the wrapper* may be responsible for the lesion Textile workers may suffer from an oil employed on the wool or yarn, not the fabric itself Among bakers, not the yeast or dough, but a relatively insignificant ingredient, cinnamon, causes severe lesions

Evaluation of a Dermatitis as an Industrial Lesion In evaluating whether or not a dermatitis is on an industrial basis we are easily subject to errors in judgment The fact that a person is continuously exposed at work *to a highly active sensitizer does not eliminate the possibility that* fingernail polish hair dye, or cold creams, *i e*, materials which have no bearing on the patient's occupation, may be the actual source Conversely, when fungi and other micro organisms are detected in smears or cultures from an affected area, we may not necessarily be dealing with a primary infectious dermatitis or a mycosis of the skin The lesions may represent a dermatitis from an industrial source upon which a secondary infection had become superimposed Further confusion may arise when *multiple sensitivity exists and positive patch tests* are obtained to substances other than those which the patient has contact at work This may make us inclined to rule out the occupational causes *Vice versa*, the occupational agent causing the lesion may, under certain circumstances (page 24), give a negative patch test, thus obscuring the situation further Good judgment and experience is required in properly interpreting the clinical observations

To complicate matters further, there is frequently a definite interaction of industrial causes *with non industrial ones due to the fact that either* one may make the skin more susceptible to the other For instance, a dermatitis may be brought on by a fungous infection on hands or feet — a non-industrial source — thus predisposing to subsequent sensitizations Con-

versely a pre existing fungous infection may become activated by an eruption elsewhere on the skin due to the contact

Prevention of Industrial Dermatitis *Pre Employment Examination* Examination of prospective employees is now carried out in most plants where workers are exposed to harmful chemicals Thorough investigation for evidence of other allergic manifestations and for a history of previous contact lesions is essential The presence of a chronic sinus disease of vague abdominal symptoms of frequent headaches may indicate the existence of an allergic state Individuals presenting allergic symptoms should be rejected for jobs where oils synthetic dyes and other complex organic compounds are handled

Some believe that the presence of a ringworm infection between the toes is one of the chief exciting factors in industrial dermatitis they advocate that special attention be given to it in pre employment examinations Patients with acne should be excluded from certain jobs Where dusts and gases are prevalent it is safer to select an employee with a dry skin persons with moist skins are better suited where liquid irritants are employed In some plants preliminary patch tests are performed for the chemicals with which the workers will come in contact This however does not necessarily guarantee that the individual failing to react will not acquire sensitization after he is employed Indeed the patch test itself may sensitize the skin and subsequent exposure to the tested substance will bring out the lesion

Protective Industrial Devices Extreme cleanliness of plant facilities as well as of workers themselves and applications of protective creams or covers are other means of prevention Employing suitable exhaust hoods proper plant ventilation prompt repair of leaky equipment preventing the accumulation of sensitizing dusts and oil films on floors work benches pipes and machinery will contribute toward minimizing contacts with irritating substances The worker should be provided with a daily change of clean overalls and underclothes Other useful working clothes include uniforms gloves aprons armguards and visors impregnable to the sensitizing substances These protective items should not contain rubber Instead certain synthetic resins of low sensitizing quality *e g* pliofilm koroseal vinilite are preferable They are less expensive non inflammable transparent and easy to clean Shower baths after work should be compulsory Finally educational effort regarding the potential danger of an occupation is often surprisingly successful as a means of preventing occupational dermatitis

Special attention should be given to proper methods of hand cleansing Dermatitis from prolonged exposure to an alkaline cleanser or to soaps can be prevented by immersing the hands in a 1% to 3% solution of acetic

acid, or in a weak solution of vinegar when the day's work is finished As hand cleansing agents, volatile solvents should be eliminated in favor of less harmful petroleum products of higher boiling range In dermatitis due to soaps, sulfonated oils, preferably vegetable oils, may be used instead They act as skin cleansers because they emulsify dirt and grease on the skin They do not defat the skin as is often falsely assumed

In patients working with paints and varnishes, the following formula is particularly useful as a protective cover

Ivory soap flakes	7 48
Glycerin, chemically pure	26 40
Sodium silicate	24 20
Tragacanth	0 21
Oil of lemon	0 16
Water	41 60

If it has been established that a dermatitis is connected with the patient's occupation, the most adequate measure is, of course, removing the patient from the particular type of work

Dermatitis from Drugs

Dermatitis is only one of many manifestations of drug allergy No drug is free from sensitizing properties (Table XI), however, individual drugs vary considerably in their ability to sensitize the skin

Drug Eruptions other than Contact Dermatitis: Any allergic disease, as well as practically every known dermatological lesion, may result from sensitivity to drugs In addition to dermatitis, the following skin eruptions can be the result of drug allergy erythemas simulating measles, scarlet fever, erysipelas, or pityriasis, fixed drug eruptions, erythema nodosum, erythema multiforme, lichen ruber, various exfoliative dermatoses, purpura, acneiform, nodular and pemphygoid eruptions, and urticaria

These dermatoses are characterized by their sudden appearance, by their symmetrical and widespread distribution, and by their bright color *As a rule they originate following ingestion, injection, or inhalation of the* drug, rather than from direct contact Some lesions are characteristic of the action of certain drugs Iodides, bromides, and chloral produce acneiform lesions, and sometimes vegetating granulomas or ulcerations Bullous eruptions originate from phenolphthalein, phenobarbital, sulfonamides, iodides, quinine, the bromides, and the salicylates Keratotic eruptions on the palms and the plantar surfaces of the feet are typical of arsenic poisoning Pigmentary changes are caused by silver nitrate, argyrol, and bismuth Hemorrhagic lesions with formation of purpuric spots occur following ingestion of salicylates, quinine, antipyrin and ergot

TABLE XI

DRUGS WHICH ACT AS IRRITANTS AND SENSITIZERS *

Aconite	Ephedrine	Oil of wintergreen (methyl salicylate)
Ammonia	Epinephrine (adrenalin)	Oil of anise
Ammonium chloride	Ergot	Oleum tiglii (croton oil)
Amyl nitrate	*Ether*	Orris root
Anesthesin	Ethyl alcohol	Orthoform
Antimony	Ethyl chloride	Opium
Apinol	Ferric chloride	Paraldehyde
Apiol	Flax	*Pennyroyal*
Aristol (thymol iodide)	Formalin	*Peroxide of hydrogen*
Arnica	Glacial acetic acid	Phenol (escharotic)
Atropine	Glycerine	Physostigmine
Avertin	Guaiacol	*Picric acid*
Balsam of Peru	*Heroin*	Pilocarpine
Barium salts	Hexylresorcinol (caprokol)	Podophyllum
Belladonna	Hyoscyamine	Potassium mercuric iodide
Benzoic acid	Ichthyol (sulphonated bitumen contains 10 per cent sulphur)	Procaine hydrochloride
Benzoin	*Iodine*	Pyrogallol
Benzol	Iodides	*Quinine sulphate*
Bloodroot	Iodoform	Quebracho (aspidosperma)
Bromine	*Iodol*	Resorcin
Butesin picrate	Ipecacuanha	*Saligenin*
Butyn	Juniper	Salicylic acid
Camphor	*Larkspur*	Sanguinaria
Camphorated chloral	Lobelia	*Scarlet red*
Cantharides	Lysol	Silver nitrate
Capsicum	*Menthol*	Sodium chloride
Chaulmoogra oil	Mercury { Mercurochrome, Merthiolate, *Metaphen* }	*Stovaine*
Chloral hydrate	Methyl alcohol	Strychnine
Chlorine	Methyl salicylate	Stypticon (cotarnin chloride)
Chloroform	*Morphine*	Sulphur
Chromium trioxide	Mustard	Tansy
Chrysarobin	Naphthol	Tartar emetic
Cinchophen	Nicotine	Thallium
Citric acid	Nitric acid	Thymol (thymic acid)
Cocaine	Nitroglycerine	Trichloracetic acid
Codeine	Novocaine (procaine)	Turpentine
Colchicum	Novol	Trinitrophenol
Copper sulphate	Nupercaine	Uva ursi
Creosote		Viburnum
Croton oil (Oleum tiglii)		Yohimbine
Delphinium		Zinc sulphate
Digitalis		

* From Schwartz and Tulipan [30]

Characteristics of Dermatitis from Drugs Contact dermatitis from drugs is the most common manifestation of drug sensitivity Pathologically and clinically it constitutes a dermatitis of the poison ivy type, and is entirely independent of the pharmacological action of the causative drug As Landsteiner [30] showed, a compound antigen is responsible for the lesion This consists of the drug linked to protein material which originated in the system It usually appears upon resumption of a medication which had been in use before This parallels the development of other kinds of acquired sensitivity When drug allergy appears to be inherited, the primary contact has probably taken place through the mother's milk,

through intra uterine sensitization, or possibly through other antecedent exposure

Once a drug sensitivity is established, it can be aggravated by ingestion of the drug, as well as through contact with it We have seen several individuals with contact dermatitis due to a salicylic acid ointment with marked aggravation resulting from taking tablets of sodium acetylsalicylate, in one instance, as little as one-half of a five grain tablet resulted in generalization of the lesion This condition persisted for six weeks

In most drug sensitivities, dermal or intradermal tests cannot be relied upon because the antigen is not the drug itself, but a combination with protein However, in dermatitis from drugs, patch tests are as useful as in lesions from other sources

History in Dermatitis from Drugs: In questioning the patient about drug allergy, it is necessary to specifically mention each suspected medication since some individuals are not aware that their long time habit of taking a laxative, a headache tablet, or a vitamin capsule is the object of our inquiry Some drugs may be taken unintentionally, or without the patient's knowledge Phenolphthalein, for instance, is present in many laxatives, in pink coloring of mouth washes, tooth pastes, ice cream, and cake icings Fresh fruits, vegetables, and tobacco may contain arsenic applied to combat insects The majority of cases of dermatitis, however, result from local applications of the drug

Fixed Drug Eruptions Special mention should be made of the "fixed" drug eruptions which constitute a form of dermatitis They consist of single or multiple, round to oval plaques, often edematous and sharply defined The lesion varies greatly in size, it is of wine-red color at first, later becoming slate bluish The eruptions are called "fixed" because on re-ingestion of the drug, former sites, although completely healed, are reactivated Such recurrences may persist at the same site for many months, and even for years The lesions were at first attributed exclusively to antipyrine, acetophenetidin, and phenophthalein Now many other medications are also deemed responsible, especially sulfa drugs, salicylates, and barbiturates

Pruritus Ani

Pruritus Ani as a Symptom of other Pathology. Pruritus ani is a symptom originating from several different causes The first step in its management, therefore, is an attempt to properly evaluate these causes This includes a careful inspection of the anal area, which in many instances determines the treatment

Rectal Pathology: By anoscopic and sigmoidoscopic examination, we

can rule out such causes as chronic cryptitis fissures, rectal prolapse and perineal tears all of which may give rise to more or less intense itching Hemorrhoids rectal polyps and fistulae are rarely responsible for pruritus The fact that malignant neoplasms of the rectum occasionally elicit pruritus makes it obligatory that thorough and repeated examinations are done on each patient *In most of the above named conditions a characteristic* feature suggestive of the rectal pathology exists namely a mucoid leak This is associated with persistent moisture and irritation about the anus *Itching about the anus is occasionally noted after an attack of diarrhea* This may produce a great amount of mucus and irritation about the anus which is accompanied by itching This type of pruritus ani as well as the *one induced by constipation is usually mild and transitory Various degrees* of pruritus are noted during the healing period following surgery This is particularly true if the anal area has been shaved

Parasites Parasitic infection especially pinworms (Enterobius Vermicularis) *cause intense itching of the anal area* The white worms about ¼ inch large resemble a small piece of cotton thread They are recognized *by their wriggling movements at the anus If they are not present on in*spection or proctoscopic examination a diagnostic enema with four ounces of saline solution should be given After being retained for a few minutes *the fluid is returned preferably into a black receptacle to aid in the recog*nition of the white worm The worms cannot always be detected at the first attempt therefore this procedure may have to be repeated from time to time

Among the other parasites causing severe itching there is scabies with its characteristic lesions and pediculosis pubis Pediculi are primarily located *in the pubic region especially if these parts are very hairy* whence they migrate into the anal area The parasites and their ova can be recognized by the naked eye

Infections with Fungi We may note a centrally healing ring" in a lesion which is well demarcated the margins are particularly clear on the sides of the lesion This is suggestive of a monilia trichophyton or an epidermophyton infection *A monilia* infection has a bright red succulent appearance reminiscent of syphilitic condylomata The more chronic lesions are of a more brownish red color they are scaly and show a tendency to lichenification The fungus can be demonstrated by direct microscopic examination of a slide containing some of the skin scrapings mixed with a 10% potassium hydroxide solution Monilia spores are yeast like round highly refractile bodies tending to grow in chains Trichophyton appears as branching septate interlacing filaments which are made up of double contour cells If grown on Maltose Agar in temperatures of 25 to 30 degrees monilia forms round pasty cream colored colonies within two to

three days Epidermophyton grows in 10 to 20 days at room temperature and produces powdery, grayish white, yellow or yellow green colonies which vary in size and contours These fungi require sugar for their growth The skin of diabetics is high in sugar content and forms a favorable soil for fungous growth (Wiener[206]) This explains the relatively high incidence of fungous infection in this area Every patient with pruritus ani should have an examination of urine and blood for sugar

Infectious Dermatitis: Excessive moisture in the anal area predisposes to bacterial infection as well Patients with excess weight, laborers engaged in heavy work or people in a habit of wearing woolen clothing may manifest this condition In most of these individuals, various pyogenic bacteria, especially hemolytic streptococci, can be demonstrated by bacteriological studies The characteristic brownish and pustular appearance of a primary staphylococcus infection as described on page 34 is not uncommon Itching in these lesions is less intense, pain and soreness much more pronounced Stokes[173] pointed out that ordinarily harmless organisms may become pathogenic for these patients It is useful to take cultures and smears for bacteria routinely in all cases of pruritus ani since infection is liable to be an important secondary factor in pruritus ani of any etiology

Other Causes of Pruritus Psoriasis occurs occasionally about the anus and perineum The lesions are very chronic, sharply demarcated, bright red and glittering they are very itchy and often painful, they are associated with other lesions characteristic of psoriasis on the extensor surface of elbows, knees and on the scalp

If the lesion extends into the vagina, it may be due to vaginal discharge, a trichomonas infection or some endocrine pathology In pruritus of endocrine etiology, there is usually an aggravation before or during the menses Pruritus ani has been described in people with sedentary habits It is presumably caused by congestion in the anal area

Whatever the cause, it should be emphasized that careful inspection of the lesion, supplemented by anoscopic and sigmoidoscopic examination and by a few laboratory procedures which can be carried out in office practice are sufficient for establishing the diagnosis (Table XII)

Pruritus Ani Proper

Having ruled out the above possibilities, we are probably dealing with pruritus ani of "obscure or idiopathic" origin This is the term usually applied to any condition, the etiology of which is difficult to track down Actually we are dealing with a contact dermatitis which may or may not be associated with atopic sensitization and which is often complicated by secondary bacterial or fungous infection

TABLE XII

STEPS OF INVESTIGATING PRURITUS ANI

Inspection for other pathology
for parasites
for appearance and distribution of lesion
Rectoscopic and proctoscopic examination
Biopsy and smear
X ray of lower bowels to rule out malignancy
Diagnostic enema for pinworms
Smear for fungi and bacteria
Culture for fungi and bacteria
Examination of urine and blood for sugar to rule out diabetes
Patch tests
Intradermal skin tests

Contact Aspect: The various causes of this contact lesion have already been discussed on page 57 Among them, the following items should be named hard rubber enema nozzles, toilet paper, soaps, suppositories, oral antibiotics, plant oils administered orally, and many drugs, especially physics * Among foods, those which contain oil and fat, nuts, or such proteins as fish are to be considered as likely contact agents There is no doubt that alcohol is often responsible Some consider coffee, others cocoa, a common offender

Dermatitis about the anus differs from that in other parts of the body in three respects

a The continuous contamination of an area of dermatitis with fecal material through bowel movement and through fecal staining from rectal flatulence enhances the chances for additional irritation from sources present in the feces The split products of foods, certain enzymes present in the feces, whole food particles, fatty acids, drugs and dyes contained in foods should be considered here Furthermore, bacteria and fungi present in feces make for constant contamination of the lesions

b The ano rectal region contains an extensive system of sweat glands which are a part of the sexual glandular system They are responsive to emotion and especially to sexual tension The sweat thus produced is high in protein and carbohydrates, thus again favoring secondary infection Excessive moisture induces solution of many otherwise harmless agents in contact with this area such as dyes of garments They thus act as secondary contact agents

c For some reason, perhaps because of its abundant nerve supply and the delicacy of the skin, itching in this area is much more severe than in dermatitis elsewhere in the system This entails greater mechanical irritation through scratching Additional contact sensitization from agents

* I have recently seen several cases of contact dermatitis about the rectum from oral use of antihistaminics

carried on the fingers ensues, especially from nail polish and cigarette stains

The patient and indeed the physician are desperate for new remedies for relief They are willing to try any medication that is offered to them Unfortunately, many of these materials are great sensitizers, especially certain disinfectants, and such pain relieving drugs as the common local anesthetics and the antihistamines They tend to overtax the resistance of an already delicate skin to the breaking point in such a manner that surgical measures remain the last hope to the victim

In addition, systemic symptoms such as fatigue, insomnia, anxiety and nervous tension constitute a new problem The patient develops a fixation on his ailment and any nervous upset occurring in his daily routine is reflected in aggravation of his anal itch This may indeed become so pronounced that it dominates the whole clinical picture It is an unfortunate mistake to consider the breakdown of the patient's nervous stability the cause rather than the effect of the anal disease Thus the victims are held responsible for their ailment and referred to a psychiatrist

In this situation, the skin about the anus is thickened and somewhat whitened, it may be dry or moist, there are multiple cracks radiating from the anus and excoriations due to scratching with a more or less marked local edema Histologically, the lesions are in every respect, identical with those of a chronic contact dermatitis in other parts of the body complicated by secondary factors

Atopic Aspect: If the patient has an allergic background, *i e*, if either his family history or the patient himself reveals an allergic history, we must give additional attention to ingested foods, to inhaled antigens or to ingested drugs to which sensitivity exists From personal observation in such cases with an allergic background, there is no doubt that pruritus ani can originate solely from eating food to which the patient is sensitive Every kind of food and every constituent of food, regardless of whether it is protein, sugar or fat must be considered Sensitivity to alcohol probably plays an important role Since there is always contact of undigested food particles or their split products with the skin lesions during defecation, a contact type of irritation of the pruritic area is difficult to rule out If the skin lesion is produced or aggravated by an inhalant, the antigen is carried to the "shock organ" (in this case the perianal region) through the bloodstream after it has entered the system through the mucous membranes of the nose, sinuses, or through the alveolar stomata One of my patients with pruritus ani who had improved considerably by elimination of a large number of foods to which he had reacted on intradermal skin testing, suffered a very severe setback following inhalation of horsehair I observed a similar case in which inhalation of thrashing dust induced a

flare up of the lesion A patient sensitive to chicken feathers became worse daily upon retiring The pruritus was completely controlled by covering the feather pillow with a plastic cover, intradermal skin tests had revealed, among other positive tests, a three plus reaction to chicken feathers Seasonal aggravation of pruritus ani in allergic individuals during a pollen season is not uncommon

As to sensitivity to drugs, I encountered a case of pruritus ani from a laxative containing psyllium, which is the seed of English Plantain, a common hayfever plant This patient gave a strong positive intradermal reaction to English Plantain Among other medications, laxatives containing phenolphthalein are said to be sources of pruritus ani In patients sensitive to salicylic acid, salicylates taken orally may greatly aggravate the condition Terramycin, aureomycin, chloromycetin and neomycin frequently induce a pruritus of long duration, whereas an existing pruritus of infectious origin may clear up promptly from these agents

Regarding atopic sensitivity in pruritus ani, the following points should be re emphasized

a In a limited number of patients with pruritus ani who are allergic, foods, inhalants and drugs can be the principal causative agents

b These agents can be detected by taking a careful history, by trial food elimination and by careful intradermal skin testing, the last being, in my experience, the most reliable method

c Contact with fecal matter usually aggravates atopic lesions about the anus This may be due to sensitivity to residual food particles which are eliminated with the feces, to mechanical irritation from roughage in the feces, to chemical irritation of such "irritating" foods as mustard, horseradish, or to the presence of bacteria in the feces

Treatment of Pruritus Ani

In view of the variety of causes of pruritus ani, the treatment must be divided into two parts First, elimination or correction of the underlying disease of which pruritus is a symptom Second, measures for the control or relief of pruritus ani proper

Treatment of Underlying Disease. The majority of conditions described on pages 148 and 149, require the services of a proctologist Infected crypts must be drained, fissures, rectal prolapse and fistulae must receive appropriate treatment, and hemorrhoids removed Where spastic constipation or diarrhea, or an "irritable colon" are responsible for itching, the medical treatment customary for this condition should be carried out This may include allergic management if it is based on food sensitivity

Bacterial and fungous infections of the anus may be treated with

1 to 3% gentian violet solution or with Castellani carbolfuchsin paint diluted 1:2 or 1:3 Desenex powder (undecylenic acid) is effective, especially if there is much moisture Extreme cleanliness is indicated and great care should be taken to keep the areas dry.

It is not possible to go into detail about the treatment of intestinal parasites Rectal lavage with hypertonic salt solution and aluminum subacetate, oral administration of enteric coated capsules of gentian violet, such time-honored worm medicines as Santonin (2 grs) followed by calomel (1 gr) combined with careful washing of fingers and clothes to prevent reinfection, are recommended by Gabriel[47a]

Treatment of Pruritus Ani Proper: For the "intractable" type of pruritus, a definite routine should be followed This includes a Extreme care in removing all traces of fecal matter b Prevention of contact with the primary cause as well as any other substances which are liable to be secondary irritants c The routine local measures outlined elsewhere, for treatment of dermatitis d General measures e Finally, some consideration must be given to the value of injections of long lasting anesthetics and undercutting operations

Cleanliness A large number of cases of intractable pruritus ani can be completely relieved by meticulous cleanliness At no time should the slightest trace of fecal matter remain in the anal area This reduces the chances of contamination of the lesions with bacteria and fungi and of prolonged contact with the many irritating materials present in the feces

Paradoxically, the two most habitual aids in maintaining cleanliness in this area, soaps and toilet tissue should be strictly avoided Sulfites and other constituents of tissue paper, as well as irritation from the friction of the paper on the sensitive area, aggravate the lesions If soaps are used, they accumulate in the anal folds during a bath or shower and may not be thoroughly cleaned off Even contact of very short duration with soap tends to increase the patient's discomfort and produces extensive itching for days

Instead, the anal area should be washed with clear tap water after each bowel movement The skin should then be carefully dried with cotton or a clean towel This procedure must be repeated during the day on one or two occasions in order to avoid accumulation of feces around the rectum from flatus Hairy individuals may benefit from shaving the anal region with a dry razor Some recommended the use of starch or other dusting powders, but since the former constitutes a good medium for growth of fungi, it should be avoided Dusting powders, no matter how carefully selected, may be irritating and should, therefore, be used with discretion

Prevention of Irritating Factors: It has been brought out above how a dermatitis in the genital area from poison ivy may originate from scratch-

ing or touching these portions with fingers which have been contaminated with the sap of the plant Contact dermatitis from other sources especially from plants and drugs may be transmitted in the same manner to the anal region Of greatest importance in this respect is *fingernail polish* and *fingernail polish remover,* which, because of frequent scratching, are common sources of sensitization in the anal area They can either be the sole source or aggravate an existing lesion Another significant causative agent is tobacco stains on the fingers Nicotine, glycol tar, pyridine arsenic[1-6] and other chemicals are thus transmitted to this region by the fingers Even if there is no actual sensitization to these substances, the scratching with *tobacco stained fingers* always tends to irritate and aggravate pruritus ani Extreme cleanliness of hands and fingers, avoidance of smoking and fingernail polish plays an important part in the treatment of pruritus ani

Another source of aggravation coincident with scratching are the *dyes of fabrics of clothes* which are rubbed into the lesion by scratching the area through the clothes Small fibers from men's pants threads of women's garments or sanitary napkins adhere to the moist lesions Indeed we may even encounter the stains of dyes from clothes which "run into the perianal area under the influence of moisture, heat and the pressure from scratching White linen or cotton mesh underclothing and white pajamas are, therefore, recommended Woolen clothing should be avoided since wool tends to irritate even the nonsensitive skin

Local Therapy As to topical therapy for pruritus ani, all measures recommended for the treatment of other kinds of dermatitis are indicated Probably the most effective local medication is potassium permanganate solution taken either as warm sitz baths (1 to 3 grain tablets in the bath tub)* or as compresses (½ grain to four quarts of water) Patients should take at least one bath daily and additional ones at any time when the itching is very severe These baths may be alternated with colloidal baths as described on page 177 In severe cases we may resort to continuous wet dressings with Burow's solution, 1 15 to 1 30 If the baths and compresses are too drying and tend to fissure and irritate the skin, mild calamine lotion with ½% phenol or such lubricants as olive oil or castor oil may be helpful In general, however, greases and ointments in this area should be avoided as much as possible

In addition to baths and compresses only two major medications should be used, namely a 1-3% solution of gentian violet every three to five days for the control of secondary infection and a 1% silver nitrate solution for touching up the fissures which form when the lesions begin to dry up Many ointments especially those generally advertised for the

* For further details see page 176

relief of itching, are liable to become secondary sensitizers and a cause for protraction of the disease The same is true with regard to antibiotics and sulfa drugs which may occasionally account for a cure if a pruritus of long standing is of infectious origin

General Measures By far the most important task among general measures is an effort to re-establish the patient's emotional balance which is under a continuous strain because of the persistent itching Relief of fatigue and control of asomnia deserve our utmost attention Vitamin B may be employed in large doses, barbiturates and bromides may be indicated However, proper counsel and encouragement are more essential than extensive drug therapy We must assist the patient in the solution of the many problems which arise in consequence to his illness In severe cases, even a temporary change of the patient's surroundings or hospitalization may be indicated

Institution of a proper regime of physical exercise is said to be of value in obese persons At least it can distract their attention from the disease In emaciated patients with a dry skin, large doses of Vitamin A and high fat diets have been recommended Some believe that injections of vaccines and of fungous extract assist in enhancing the patient's general condition Others feel that a trial with Cortone and ACTH is justified [171a]

Surgical Procedures Various surgical procedures have been practiced in intractable cases of pruritus ani of unknown etiology They are mentioned here even though their value is dubious and reliance upon them is waning They are, injections of oil soluble anesthetics and undercutting operations which are designed to sever the nerve supply of the anal area and thus eliminate the itching Stone [175a] injected under local anesthesia, 2 to 4 minims of absolute alcohol through multiple punctures about ½ inch apart Buie [72] advocated 40% ethyl alcohol in amounts from 20 to 41 cc subcutaneously around the anus Others (Gabriel [93]) employ such oil soluble anesthetics as 30 to 35 cc of 5 per cent nupercaine in almond oil These injections usually control the itching for several weeks However, there is so much risk of sloughing, secondary infection and scarring, that few proctologists resort to this method

The purpose of such operations as the one advocated by Ball [74] is to undercut the anal and perianal skin in order to section the sensory nerve distribution and thus produce anesthesia This and similar procedures are effective but for a short time in most instances Swinton [188] reserves these radical procedures for extremely severe cases in which other measures have failed Patients should be warned in advance not to place complete reliance on these surgical measures

X-ray treatment for the relief of pruritus ani is being abandoned True, when there is excessive sweating in the anal region relief may occasion

ally be obtained by this means. However, the risk of favoring the development of cancer in this area from x-ray treatment is too great

Pruritus Vulvae

Pruritus vulvae has been given much less attention in the literature than it deserves, considering the disability and distress for which it can be responsible. Its clinical importance is indicated by the fact that according to Jeffcoate [90] 10 per cent of all gynecological patients complain of some kind of itching around the vagina As in pruritus ani, the success of any therapeutic endeavor rests upon the proper appraisal of its etiology

Non-Allergic Causes: ***Non Gynecological Diseases:*** Various systemic diseases (Table XIII) manifest itching about the vulvae They are generalized urticaria, uremia, jaundice, Vitamin A and B deficiency, and lypmh adenoma Glycosuria and diabetes, play an important part in the causation of pruritus Rectal diseases such as hemorrhoids or fissures, rarely, if ever, account for pruritus vulvae The same is true in cystitis, pyuria and other urinary tract diseases in which a change of urinary acidity takes place Even urinary incontinence is not considered to be a cause of pruritus vulvae These urological conditions may lead to excoriation and soreness of the vulvae, but rarely to true pruritus

TABLE XIII

THE INCIDENCE OF VARIOUS CAUSES IN 254 CONSECUTIVE WOMEN WITH PRURITUS VULVAE

(Jeffcoate's [90] Table—Modified)

		No of Cases	Percentage (Excluding Trichomonas)
Trichomonas vaginitis		100	
Chronic cervicitis, cervical erosion, polypi		28	18.19%
Prolapse		12	7.79
Glycosuria, diabetes mellitus		8	5.19
Fungous infections		6	3.89
Deficiency states, namely		20	12.99
Vitamin B2 deficiency	(3)		
Achlorhydria	(13)		
Iron and liver (anemia)	(4)		
Skin diseases not specific to vulva (psoriasis, intertrigo carcinoma)		14	9.09
Post menopausal vaginitis		6	3.89
Psychogenic causes		18	11.69*
Leukoplakia, Kraurosis Vulvae		13	8.15*
Idiosyncrasy to chemicals		5	3.25*
Allergic states		4	2.59
Unknown		20	12.99*
		154	100.00%

* The addition of these percentages (36.38%) approximates my estimation of the incidence of Contact Dermatitis

Other Dermatoses: We must rule out pruritus vulvae as part of general dermatoses Scabies, lichen planus, pediculosis and especially psoriasis give rise to extensive itching * Much less severe is the itching of lichen sclerosus (atrophicus), a very chronic condition, characterized by a parchment-like, well demarcated eruption, laterally from the labia and the anal mucosa These lesions often become fissured and show bleeding points.

Pregnancy: Pruritus is a common feature in pregnancy. Since this is only a temporary condition, it is not as significant clinically as are the other causes It is generally assumed that the itching of pruritus in pregnancy is due to stasis in the vaginal region

Trichomonas Infection. In perhaps the largest number of patients (100 out of 254 cases in Table XIII), pruritus in this area is due to trichomonas vaginalis In these infections, the itching is present inside as well as outside of the introitus It is worse shortly after the menses It is usually, but not always associated with vaginal discharge The organism can readily be demonstrated under the microscope

Fungous Infections. Next in importance are fungous infections in the vaginal and inguinal area, especially infections with monilia These lesions are quite typical of thrush The vaginal mucosa is covered with a thick, yellowish-white membrane which sometimes appears in clumps like those seen in cottage cheese When the membrane is wiped off, the vaginal tissues are slightly swollen and edematous showing a characteristic dusky blue to purple discoloration The labia are very tender to the touch and are often accompanied by a vaginitis with a foul-smelling, creamy discharge Laboratory identification of the yeast-like organism through smear or culture is simple

Trichophyton infections usually start from reddened blotchy areas on the labia majora varying in sizes from 1 to 4 centimeters There may be small fissures about the affected area The lesions may become very extensive and may affect the inner aspect of the legs and the groin This condition is often associated with athlete's foot

Glycosuria or diabetes are frequently accompanied by fungous infections since the high sugar content of the skin favors the growth of fungi

Cervical Pathology. It is doubtful whether or not cervicitis and other uterine pathology *per se* can induce pruritus vulvae When excessive itching is present it is usually due to a trichomonas infection associated with the uterine condition since the vaginal discharge forms a favorable soil for its development The same is true in pruritus coincident with prolapse of the vagina In this latter condition, additional factors other than infec-

* For further elaboration on these conditions see page 15

tion account for an itching sensation such as congestion mechanical irritation and excoriations of the mucous membranes

Menopausal Pruritus Pruritus in the elderly woman is a definite disease entity which differs from pruritus in early life by the fact that the external genitalia show evidence of atrophic processes and that specific infections are absent According to some investigators lack of estrogens is held responsible for this condition Senile post menopausal pruritus is occasionally associated with a thin blood tinged vaginal discharge and with numerous superficial erosions on the vaginal wall The areas involved are confined to the parts which are irritated by the discharge namely the lower halves of the labia and the perineum leaving the clitoris free Itching is more intense during the day than at night when the patient is in a horizontal position and the discharge does not gravitate through the vulva Vaginal smears reveal that the epithelial cells exhibit no cornification There is a moderate number of leukocytes This condition should not be confused with leukoplakia and kraurosis vulvae which also occur in elderly patients

Deficiency Diseases Some have identified the presence of pruritus with a lack of certain dietary constituents Vitamins A and B and iron are mentioned A lack of hydrochloric acid in the gastric juice is frequently observed in cases with pruritus However it seems that these are manifestations of other conditions rather than a primary deficiency disease Achlorhydria for instance is frequently noted in allergic diseases which as shown below play an important role in pruritus vulvae Deficiency in iron and Vitamin B_{12} are encountered in anemia which sometimes causes pruritus As to Vitamin A deficiency the marked hyperkeratosis present at the involved parts suggests a lack of this vitamin in the patient s diet and encourages the administration of large doses If there is however a glossitis and cheilitis in a patient with pruritus vulvae a primary Vitamin deficiency may the basic source of the pruritus

Psychogenic Factors Concerning the psychogenic aspect of pruritus vulvae I wish to refer to the discussion on pruritus ani on page 152

Atopic Sensitivity There are no adequate statistical studies on the question of how much atopic sensitivity enters into the picture of pruritus vulvae Considering that about 10% of the normal population are said to be allergic and that in an allergic patient previously irritated lesions ("shock organs") are liable to flare up from inhalation and ingestion of antigens to which sensitivity exists atopic sensitivity must be considered important as a primary as well as a complicating factor Hailey[60] states that 66% of 520 consecutive cases of pruritus vulvae and ani present a family history of allergy and 85% of his patients had had eczema In contrast with these

figures, Hill[784] estimates that allergy is a causative factor of pruritus in about 10% of his cases

My own experience indicates that the incidence of allergy in pruritus vulvae is considerable I have seen many allergic women who complained of itching in the vagina and vulva following ingestion of certain foods On several occasions, injections of antigenic extracts (e g, pollen, horse serum), in excess of the patient's tolerance elicited severe itching in the vulvae Ingestion of drugs (aspirin) and injections of penicillin not infrequently give rise to pruritus vulvae

Contact Sensitivity. *Incidence:* I believe that contact dermatitis is by far the most important cause of pruritus vulvae If we eliminate from Jeffcoate's table[80] the cases in which trichomonas infection was responsible, the incidence of "unknown and psychogenic" sources is 38%. Upon comparing the frequency of contact dermatitis encountered elsewhere on the body with the low incidence (5%) of dermatitis in the vulvar area, one cannot help but conclude that the bulk of the "unknown and psychogenic" cases actually represents those of contact dermatitis To this number should be added some labelled "achlorhydria," a common feature in allergic sensitivity and those of leukoplakia and kraurosis vulvae which in all probability (Wiener[796]) represents the end result of a contact dermatitis in the vulvar region

Predisposing Factors The same factors which predispose to pruritus ani prevail in pruritus vulvae They are, excessive perspiration and moisture, abundance of infectious material which is present in vaginal discharge and, chemical irritation brought about by agents eliminated through the urine

Causes The substances responsible for contact dermatitis in the vagina reach the area through different ways

a Many are *introduced into the vagina* through various modes of vaginal hygiene They induce an irritation inside of the vagina which is more intense about the labia The hard rubber nozzle of a douche bag, anticonceptients, disinfectant tablets, suppositories, rubber pessaries and condoms are some of the responsible agents Absorbent material containing cellulose inserted into the vagina during the menses should be considered If the agent is fluid, i e, solutions of phenol, merthiolate and other disinfectants, it might spread down along both thighs, affecting particularly the approximate surfaces of the upper thigh In rare instances, wooden, plastic or lacquered articles may be inserted into the vagina for masturbation Sometimes we encounter sensitivity to medications which are inserted, blown or douched into the vagina to relieve a pruritus which was originally due to trichomonas or other sources Thus a contact sensitization can be superimposed upon a non allergic type of pruritus

b Other items elicit symptoms outside the vulva *through direct external contact* The fabrics and finishing agents of panties and belts containing nylon, rayon, rubber and certain resins affect the area where these garments come in contact with the skin These lesions do not extend inside the vagina, they are confined to the major labia, the folds of the inguinal region and the mons pubis, affecting especially the skin where friction and perspiration prevail An important offender is toilet tissue, especially when it contains dyes Many women wipe themselves forward toward the vagina after a bowel movement, thus the focus of a lesion from toilet tissue is in the perineal area Scented powders, deodorants, perfumes and soaps induce irritations in the inguinal folds The finishing materials present on sanitary napkins may be the source of lesions on the vulva with additional areas from friction on the thighs Severe and chronic pruritus not infrequently originates following operations or childbirth from disinfectants employed pre operatively on the skin The sharp demarcation of these lesions and the typical history facilitate the recognition of this source

c Other agents are *transmitted indirectly* to this area *through the fingers* There is no predilective localization for this type of contact Finger nail polish and polish remover as well as tobacco stains on fingers should be given foremost consideration in this group In addition, practically any other agent in contact with fingers may produce pruritus vulvae through secondary contamination *e g*, poison ivy, nose and eye drops, hand creams hair setting fluids and therapeutic ointments applied elsewhere on the body Mitchell[120] mentions the case of a veterinarian whose wife developed pruritus vulvae from his hand cream which he applied at night to his hands before retiring I have observed a patient with pruritus vulvae with lesions on the dorsal parts of the fingers from scratching an itchy area to which antihistaminic ointment had been applied The patient was contact sensitive to antihistaminics

d Some contact irritants are *transmitted through the urine* and perhaps through *vaginal discharge* In this case, the focus of irritation is localized in the posterior aspect of the vulva and in the upper parts of the thighs, where urine and vaginal secretion run down, the region of the clitoris remaining free Traces of sulfa drugs, phenolphthalein penicillin and certain dyes are eliminated through the urine

Leukoplakia and Kraurosis * Some believe that two other conditions of "unknown origin" namely, leukoplakia and kraurosis are a part of the clinical picture of contact dermatitis of the vulvae According to Wiener[204] transitional phases between these three conditions are common and the same

* The conception of these conditions is somewhat confused authors differ in their views as to whether or not they constitute separate disease entities

patient may suffer from all three at different times The disease starts after the menopause with a subacute dermatitis confined to the mucous membranes of vulva and perianal areas Extra-genital lesions do not occur as they do in cases of lichen sclerosus atrophicus Sudden exacerbations followed by regressions are common Secondary infection is frequently present Some cases may improve in this stage, whereas others develop into the more chronic phase of kraurosis characterized by leathery rigid skin with multiple fissures, of bluish white appearance, dry and depigmented Gradually the hair, the labia minora and the clitoris disappear and complete atrophy of the vulva develops In all these stages, intense itching is present and leukoplakia, *i e*, discrete white plaques with a furrowed surface, can be found in almost every instance This condition may lead to cancerous degeneration There are, or course, many patients in whom the dermatitis retains its original appearance and the above described secondary changes do not develop

Treatment. In pruritus vulvae, the same therapeutic principles should be employed as those outlined for pruritus ani on page 153 They are particular observation of meticulous cleanliness, the use of sitz baths in weak potassium permanganate solution, and compresses with cooling lotions if the lesions are acutely irritated The patient should strictly avoid irritating soaps and ointments and be aware of drugs to which sensitivity exists or might develop during the course of treatment

In some women, the douche itself can be the sole cause of vaginal discharge and subsequent irritation It is stated (LaVake [103]) that douches disturb the normal chemistry of the vagina, the balance of the normal protective flora and wash out the lubricating protective mucus Plain tap water without soap should be employed frequently for cleansing the area and particular care should be taken to have the skin dried gently after each bath

Oral administration of hydrochloric acid, Vitamin A and Vitamin B_2 have been recommended as supportive measures

Certain procedures for control of pruritus vulvae, such as undercutting operations, tattooing the skin of the vulvae with mercury salts and injections of oil soluble local anesthetics may be resorted to if other modes of therapy have failed However, the patient should be made to realize that these measures do not counteract the original cause of the disease X-ray treatment, as purely ameliorating therapy has been abandoned by most clinicians *

* Ballentine recommends periodic drying of the vulva by means of an air current three or four times daily The patient is to lie on a bed, an electric fan is placed on a table near the bed and directed toward the vulva The patient is instructed to separate the labia as much as possible This treatment is employed for fifteen to thirty minutes [19]

If pruritus is due to causes other than contact allergy, control of the underlying causes is necessarily the foremost consideration

For *Trichomonas infections*, Cornell[30] recommends the following routine The patient is instructed to insert one Devegan* tablet nightly on retiring and to report for office treatment the first, third and fifth day after the onset of menses for four consecutive periods At this time, the vagina is cleansed of blood and three Devegan tablets are inserted high in the vaginal vault After the menstrual period, the patient resumes the nightly use of the tablets No douches are used One week following the fourth menstruation, the vaginal secretion is examined for trichomonas If negative, a final check of this examination is made one week after the following menstruation

For *fungous infections*, .5 to 3% gentian violet or Castellani carbol fuchsin may be used Trichophyton infections respond well to undecylenic acid (Desenex Powder) and Caprylic acid (Naprylate) Davids and Kurtin[34] employ a 15% sodium propionate ointment to the vagina and perianal skin two to three times daily They also use 5% of a sodium propionate solution in douches, or vaginal suppositories containing 10% sodium propionate in cocoa butter For monilia infections, tampons soaked in 2 drams of sodium borate dissolved in one ounce of glycerin may be placed high in the vaginal vault These treatments are given every fourth day

For *post-menopausal pruritus*, Cinberg[28] follows a routine which endeavors to have the affected area constantly covered with a thick coating of a bland ointment and thus eliminate all possible irritation to these parts A cream consisting of petrolatum alba with 20% starch and 30% zinc oxide is kept on the vulva for a minimum of three weeks It is covered with squares of gauze to protect the patient's clothing As the salve wears off, more is added The patient may bathe as often as she desires but she is not to attempt to clean off the salve After her bath, she replaces the ointment which is washed away In addition, Cinberg employs androgens for the purpose of stimulating the sebaceous glands, inducing oiliness of the skin and hair and enhancing vascularization of the skin 2 mg of testosterone propionate are added to 1 gr of ointment † Others prefer local treatment with estradiol benzoate cream or suppositories containing 2000 units of estrogen nightly for ten days to two weeks Estrogenic therapy should not be carried on for a prolonged time because of the danger of inducing cancer in a condition which is considered pre-cancerous in itself

In the advanced cases of *Kraurosis*, vulvectomy may be the only effec-

*Acetarsone with boric acid and hydrolyzed carbohydrates

† Perandren Ointment — Ciba

tive treatment The indications for this type of surgery should be carefully weighed since ill-advised surgery may be harmful in many respects

Psychosomatic Aspect of Contact Dermatitis

In recent years there has been an increasing tendency to attribute certain cases of contact dermatitis to psychosomatic causes Much literature has accumulated on this subject In my own practice, a very large percentage of patients state that they had been told by their physicians that their skin disease is caused by "nervousness" Significantly, those in which the causes are most obscure are the ones who present this information most frequently This is in line with our experience in other allergic diseases, and indeed, with any other chronic illness in which the causes are difficult to determine

It is generally acknowledged that nearly every so-called "normal" person exhibits some psychosomatic traits Moreover, every family and every individual faces problems" daily which might give rise to, or aggravate, a tendency to psychosomatic manifestations It is, therefore, not surprising that a psychoanalytical approach in dermatitis will bring out some features in every patient's make-up which may tend to classify him as a psychosomatic individual

Furthermore, in a patient afflicted with dermatitis, any nervous upset invariably increases his subjective manifestations, especially his tendency to itching Since both the patient's family and his physician are likely to sense this, they may be lead to the mistaken conclusion that his skin lesion originates from a psychosomatic imbalance We may even abandon our search for causative agents and instead refer the patient to a psychoanalyst I have seen several patients in whom this approach had failed and who thus lost confidence in any medical treatment They resorted to charlatans or harmful patent medications

Even though a contact dermatitis is always due to contact with a sensitizing agent, we can certainly not entirely disregard the fact that psychosomatic aggravation does occasionally enter into the clinical picture This, however, is not sufficient reason to have the patient subjected to expensive and unnecessary psychotherapeutic procedures because we have been unable to detect the cause The financial obligations resulting from chronic illness, the fear of permanent mutilation of the body through the prospect of permanence of the lesions, the unfavorable comments by friends and neighbors concerning any skin disease which lay persons may identify with lack of cleanliness, the possibility of the interruption of a happy home life because of the lesions, the difficulty of obtaining a proper job because of the dermatitis, certain fears and "don'ts" which have been

unjustly imposed upon these patients, the constant and severe itching with its sequela, lack of sleep, and finally the physicians' statements that this is all 'caused by nerves" are ample reasons to unsettle any normal person's mental outlook and to enhance his worries and concerns The physician can do a great service to his patient by advising him properly on these questions and by allaying his fears

X

Therapy

The major steps in the treatment of contact dermatitis are the following 1) Elimination of the Causative Agents and 2) Specific desensitization whenever possible and 3) Relief of existing symptoms

Elimination of the Causative Agents

In discussing the elimination of the offending agents we shall first consider general eliminative measures and then deal with control of special situations

General Measures *Avoidance of the Primary Cause* Once an agent has been determined to be the cause of a lesion its avoidance in the majority of cases does not present much of a problem There are however instances in which difficulties may arise Some patients have always suspected foods and acids as the source of their trouble they are not easily convinced that an item as harmless as a zipper or a hair pin could possibly be the source of all their troubles Others fail to cooperate when we are unable to obtain a positive patch test even though other evidence makes us certain of the cause Some refuse to abandon certain articles or to set aside a hobby Still others hesitate to wear cumbersome protective appliances for the prevention of contact with a suspected agent

Even when the patient gives us his fullest cooperation it may be extremely difficult to avoid an agent completely There are many occupations such as the oil industry in which protective coverings of the skin as outlined below are inadequate In this case the contemplation of a change of occupation remains the only alternative Real hardships may thus arise especially if the patient has arrived at his present level of earning through many years of training and effort

Avoidance of Indirect Contact Sometimes a patient is convinced that he has thoroughly eliminated an agent and yet unbeknown to him his skin continues to be exposed to it constantly through indirect contact It has been shown (page 126) that the sap of poison ivy adheres to such articles as garden utensils playthings pets etc an ointment may contaminate

clothing and cause development of a dermatitis in a person handling the contaminated clothes in a cleaning establishment Attention should also be given to avoiding other articles containing the same chemical irritant as that contained in the original source In nickel dermatitis from a wrist watch for instance the original site on the wrist may flare up when items such as a zipper garter clasp eye glass frame or a metal button all of which contain nickel touch the skin elsewhere

Secondary Contact Agents Another important therapeutic consideration is the avoidance of agents which might induce development of multiple sensitivity All local medications should be regarded as potential sensitizers until they are proven innocuous If a medication is interrupted and resumed after two or three weeks particular caution should be observed as this is the critical time interval favoring the development of new sensitizations In dermatitis of the eyes the elimination of all soothing ophthalmic medicaments may become a great hardship to the patient A list of drugs to which patients are particularly prone to become sensitive is presented in Table XIV

Avoidance of Contributing Irritations Finally we must eliminate contributing factors which are not necessarily sources of sensitization but which are apt to induce mechanical chemical and thermic irritation These are objects causing friction or callouses they may be articles of clothing which tend to produce moisture and heat Wool for instance irritates the skin of many normal individuals not because they are sensitive to it but because of the mechanical action of its fiber on the skin Patients with a dermatitis invariably complain of aggravation of the affected area by woolen articles A strong concentration of an otherwise harmless chemical may do considerable harm and prevent healing of a lesion For example a saturated *boric acid solution* was the cause of constant irritation in a patient with a dermatitis from eye drops When he changed the solution to one properly diluted the lesions responded well

Most soaps are injurious in dermatitis mainly because they raise the pH of the skin Even some of the *non allergic superfatted soaps* may aggravate the lesions Especially during the acute phase of the eruption soaps should be strictly avoided A patient can take his daily baths without soaps and cleanse his body sufficiently by gently rubbing the skin with a dry towel after the bath By doing so he will remove the dried scabby secretions and other detritus adhering to the skin which constitute a fertile soil for bacterial and fungous growth Some patients protect the lesions from water falsely assuming that it is harmful to their skin they do not realize that it is the soap used when bathing which causes their discomfort

Protective Covers for the Skin If the object causing the dermatitis

cannot be eliminated, the next best thing to do is to either cover the affected portion of the skin or the offending object. On the legs and arms, bandages or compresses protect the skin in two ways, by eliminating contact with the irritant and by providing local medication. Parts of the body surface can be covered with a sleeve made of white cloth, if a coat or blouse is the cause. White socks may be worn if the lesions are present on the ankles. In dermatitis from oils or other chemical sources, boots and aprons may shield the affected areas. They must be properly designed and adequately ventilated. Lesions on the fingers due to a moist substance can be protected by a piece of white cloth, covered by a rubber finger cot. If a solid agent causes dermatitis on the hands, white cotton gloves may provide adequate protection. They must be kept meticulously clean, and changed frequently. If fluids or oils are responsible for dermatitis on the hands, the patient, a housewife for instance, might wear rubber gloves lined with surgical knitted cotton gloves for protection. The inside lining

TABLE XIV

MEDICATIONS FREQUENTLY RESPONSIBLE FOR FLARE-UPS OR PROLONGATION OF CONTACT DERMATITIS

(From Schwartz and Tulipan[106] [Modified])

- Tar and Derivates
  - Phenol and Cresols
  - Ethyl aminobenzoate
  - Tars decolorized
  - Hydroxyquinoline
  - Hexyl m cresol
  - Resorcin
  - Butesinpicrate
  - Nupercaine hydrochloride
- Metallic Compounds
  - "Merthiolate"
  - Ammoniated mercury
  - "Mercresin"
  - "Metaphene"
  - Phenylmercuric nitrate
  - Orthochloro-mercuriphenol
  - Potassium mercuric iodide
  - Mercurochrome
- Phenol Products
  - Methyl salicylate
  - Pine tar
  - Juniper tar
  - Calendula
  - Grindelia
  - Tannic Acid
- Miscellaneous
  - Ointment bases
    - Lanolin
  - Antibiotics
    - Sulfa Drugs
    - Penicillin
    - Furacin
  - Anti Histaminic ointments

prevents contact with the rubber to which the skin is liable to become sensitive

In dry lesions of limited size non allergic adhesive tape* may be temporarily employed This product is also helpful in preventing friction on the neck with a coat or a dress collar These patches must be removed for a few minutes at least once daily to ascertain that there is *no* maceration of the skin around hair follicles and subsequent infection underneath the adhesive patch Collodion either alone or in combination with medications (tar) may occasionally serve in a similar fashion as a protective covering for the skin This however is only feasible if the dermatitis is in a non exudative state and is therefore not subject to too much irritation

For prevention of occupational contact preparations have been advised by Klauder[96] which create a coating on the skin They protect against prolonged contact with oil water soaps and other chemicals When the protective ointment is washed off after work whatever irritant is present on the skin is removed simultaneously with the ointment Some of these preparations are non greasy and adhere to the skin They are listed in Table XV

Covering or Replacing Causative Objects In some objects the damaging surfaces can be successfully covered or replaced by non irritating ones Eye glass frames containing nickel for instance can be covered by plastic covers if immediate action is indicated temporary protection can be secured by taping the frames with Scotch tape or adhesive tape A toilet seat can be replaced by one made of aluminum or covered with special protective paper The pocket of a man s pants can be lined with oil cloth which will shield the thigh from contact with the articles carried in it Keys handles faucets knobs scissors or other tools can be covered with tape or cloth if it is not possible to remove an irritating varnish or to apply a coating of paint which has proven harmless to the skin A garter clasp a zipper or rubber parts of an undergarment worn directly on the skin can be covered with cotton cloth When it is hot however and these garments become soaked with perspiration the irritant chemicals penetrate such a protective cloth and the articles in question may have to be discarded

Desensitization†

Specific desensitization against a damaging agent is possible for a limited number of contact agents only namely those in which the excitant agent is a fatty substance The ingredients of most others are harmful

* Made by Duke Laboratories New York

† Some restrict this term to the animal experiment and prefer the term "hyposensitization" in man

chemicals, the extracts of which cannot be injected into the system Desensitization against plant oils, especially against poison ivy, is practiced most extensively regardless of the fact that the scope of this treatment should be limited as outlined below On the other hand, injections with oil extracts of pollens in seasonal dermatitis from ragweed, timothy, and certain trees are very useful if administered when indicated Some clinicians employ the oil of wool, of cotton seed, flaxseed, and oil present in house dust Extracts are injected in increasing doses similar to the routine

TABLE XV

PROTECTIVE OINTMENTS

(Suggested by Klauder[*])

For prolonged contact with oil

Zinc Oxide	25 0
Kaolin	25 0
White petrolatum	50 0

Smear thickly on skin of entire forearm as base for the following

Ethyl cellulose	5 0
Mastic	8 0
Castor oil	1 0
Acetone (Technical)	86 0

This solution is applied by means of a brush It dries and leaves a varnish like film not easily rubbed off which repels oil and water

For prolonged contact with soapy water

White wax U S P	10 0
Lanolin	5 0
Nerol A	12.5
Stearic acid	2 0
Petrolatum	70 5

For prolonged contact with plain water

White wax U S P	10 0
Lanolin	5 0
Sulfonated olive oil (commercial 75%)	10 00
Petrolatum	75 0

Non greasy preparations that dry on skin and do not rub off

Nerol A	12 0
White wax U S P	12 0
Anhydrous Lanolin	6 0
Cholesterol	6 0
Sodium silicate commercial sol	5 0
Ammonium hydroxide 10% sol	5 0
Water q s	
Mastic N F	20 0
Myrrh	5 0
Pyroxylin	3 0
Castor oil	2 0
Acetone q s	
Sulfonated neatsfoot oil	45 0
Light mineral oil	45 0
25% aqueous solution of gelatin	10 0

in desensitization with atopic antigens These oil extracts have also been prescribed orally in gradually increasing amounts

Indications for Plant Oil Injections There is a great deal of con troversy concerning the efficacy of poison ivy injections Many have been disappointed with the results Indeed poison ivy injections not infre quently account for considerable aggravation and protraction of the course of a dermatitis In my experience this is not the fault of the treatment but the manner in which it is administered Its technique has to be carefully adapted to the particular stage of the lesions because in many instances the threshold of the aggravating effect lies very close to that of its therapeutic action Extreme caution good judgment and careful observation of the results from each treatment are requisites without which no one should undertake this therapy In cases of very acute dermatitis I have abandoned injections entirely In subacute or chronic cases it is successful only if the doses are carefully gauged

For prophylactic purposes injections of plant oils are helpful only if administered over an extended period of time The effort and expense in volved does not always warrant their use especially when it is possible either to avoid touching the plant or to eradicate it from a certain area We may be obliged to employ prophylactic desensitization in florists gar deners farmers or in patients who cannot forego their golf game or their hunting trip and the consequent contact with the plant

Technique The oily excitant is extracted from the plant or pollen by means of a fat solvent such as absolute alcohol or an alum precipitated pyridin solution * Subsequently the fat solvent is evaporated and the residue containing the oily excitant diluted with either sterile olive oil almond oil or corn oil in a concentration of 1% (See Appendix II)

Prophylactic Treatment As in other modes of desensitization it is difficult to set up a standard technique since much depends on the indi vidual degree of sensitivity on the method of preparing the extract and especially on the patient s response to each treatment

Standardized Methods Before presenting my own experience with individualization of this treatment which I believe is a very satisfactory method I wish to review several standardized techniques designed for various types of extract

When commercial extracts are used it is suggested to administer five intra muscular injections of 1 cc of the oily solution at intervals of five to 10 days The series of injections should be completed before exposure to the plant Shelmire [163] starts the treatment with smaller amounts and increases the doses at two week intervals in the following manner

* The following concerns are manufacturers of poison ivy preparations Abbott Labora tories Cutter Laboratories Hollister Stier Laboratories Lederle Laboratories Sharp and Dohme Parke Davis and Co

Dose No	Poison Ivy Extract cc	Dilute with Sterile Water to cc	Inject Amount of Mixture cc
1	0 1	20	1
2	0 1	10	1
3	0 1	4	1
4	0 1	2	1
5	1 0	1	1

For doses 6 to 10 the same dilution and amount as dose 5 is given

If an alcoholic extract is used it is recommended that the material be diluted to 1 100, 1 150 1 130, and 1 10 and that 1 cc of each dilution be administered once weekly The precaution of diluting the extract is *taken because the alcoholic solution causes considerable pain at the site* of injection

Spain and Strauss[180] recommended the following doses for their alum-precipitated pyridin ivy extract

0 1 cc of a 1 50 dilution
0 4 cc of a 1 50 dilution
0 8 cc of a 1 50 dilution
0 2 cc of a 1 50 dilution
0 5 cc of a 1 50 dilution at seven to 10 day intervals

They claim that their extract is much less painful but equally as effective as the others

Individualization of Treatment: While standardization of prophylactic injections for poison ivy may be entirely satisfactory, I feel that individualization of the prophylactic injections according to the patient's response is more effective Some require a more prolonged course and larger final doses than usually recommended The degree of local reaction resulting from the injection serves as a guide as to whether the doses should be increased and the intervals between the treatments be shortened The initial *dose is 1/10 cc of the undiluted extract There should be a local swelling* and some irritation at the site of injection If this is not noticeable the dose is increased after 10 to 20 minutes by ½ to twice the previous amount It may take from one to three days until this irritation subsides It is not safe to administer the next dose before the swelling from the previous one has completely disappeared

After the patient has reached a certain dose without ill effect the injection should be repeated once a week throughout the season during which the patient is exposed to the plant The more time allowed for prophylactic desensitization and the more injections are given, the more effective the treatment

There are patients in whom the site of each injection becomes markedly infiltrated Within five to seven days an eruption develops on the injected area which spreads considerably and develops into a localized lesion of

dermatitis In these individuals another injection will not only fail in its role as a prophylactic but will greatly accentuate the state of sensitization and elicit a dermatitis of considerable severity and of long duration

Oral Desensitization The method of desensitizing" a patient by administering oil extract by mouth is reviewed here only in order to complete the discussion on the subject I personally abandoned this method after a short trial period It is based on the use of oral vaccines as well as on the experience of farmers and other people who have ingested leaves or berries of poison ivy and claimed the prevention of an outbreak upon exposure to the plant Ambough originally advocated administration of an alcoholic tincture of poison ivy He started with doses of 1 minim and increased the amount gradually to 10 minims Later Shelmire[162] recommended oil extract from dry leaves of ivy and other plants diluted in corn oil This was administered in gelatin coated capsules the doses and concentration of which were gradually increased Amounts as high as 20 to 40 cc of the oil extract were given over a period as long as six to nine months Considerable success in preventing plant dermatitis was claimed

There are two major objections to this method Because of the uncertainty of intestinal absorption of the extract an indefinite and sometimes very substantial amount of the material may be eliminated through the bowels At a subsequent time when intestinal absorption happens to be more effective ingestion of a slightly larger dose of the oil can lead to very serious generalized reactions The other drawback is that in some patients the oil irritates the mucous membranes of the intestinal tract They react with violent gastro intestinal upsets stomach pain nausea vomiting and abdominal cramps A relatively large percentage of individuals develop serious pruritus ani forcing them to abandon this treatment

Phylactic Injections of Ivy Oil It is best to avoid injections of ivy oil during the acute phase of ivy poisoning as stated above If we consider giving this treatment during the state of involution or in a chronic case when the patient is repeatedly exposed to the plant the first dose should always be very small *1/20th of 1 cc of the extract diluted 1 10* in almond oil may relieve the itching and lead to prompt improvement of the eruption If the lesion is more acute the first dose must be diluted with sterile almond oil 1 100 or 1 500 Whether the amounts can subsequently be increased depends entirely on the local response at the site of injection and on the appearance of the dermatitis following each treatment At no time should doses larger than 3/10 cc be given while a poison ivy lesion is present It is recommended to administer the alum precipitated pyridin extract in doses of 0 1 cc of a 1 500 or 1 000 solutions at two to four day

intervals. Keil[92] uses intradermal injections of the synthetic ivy oil in peanut oil (.001%) during the acute state of ivy poisoning. He maintains that there is less danger of a generalized reaction with this material. In my experience, the incidence of a generalized reaction depends on the acuteness of the lesion and on whether or not the extract is properly diluted, rather than on the kind of extract used.

A recent publication by Shaffer *et al*[173] emphasizes the need for further caution. They reported the death and a near fatality following four daily injections of poison ivy extract administered during the acute phase of the disease. Both patients developed a glomerulonephritis.

Other Uses of Oil Extracts: The same technique as in the treatment of poison ivy can be followed in treating dermatitis from other plants or pollen. I frequently use oil injections for ragweed, grass, some tree pollen and occasionally for chrysanthemum and tulips. During the course of these treatments contact with the respective plants or pollens should be avoided. Should this be impossible, as for instance during a pollen season, greater dilutions, smaller doses and more frequent injections must be employed lest the lesions become aggravated. With this precaution phylactic injections with pollen oils are of value not only in dermatitis due to pollen but also in cases due to other sources in which pollen is an aggravating factor.

Since it is impossible to avoid airborne pollen during a hay fever season preventive treatment with pollen oils must be considered in all patients with dermatitis from contact sensitivity to pollen. If these patients have frequent direct contact with the plant, like farmers do, the prophylactic treatment should be much more intensive than if airborne pollen touches the skin.

In ragweed dermatitis I have frequently employed the unconventional method of administering an aqueous ragweed extract, the kind employed in hay fever treatment. These patients obtain considerable benefit. Here, again, the degree of local swelling following the injection serves as a means of gauging the doses and indicates whether the treatment will be effective. A local reaction should neither be too small nor too extensive. A generalized reaction resulting from the aqueous extract may aggravate the dermatitis considerably.

Symptomatic Treatment

Most symptomatic or palliative measures employed for relief of contact dermatitis consist of topical applications. Judicious use of this therapy contributes a great deal toward shortening the duration of the condition, whereas, routine administration of local measures, lack of supervision and

failure to observe the individual's response to the treatment are liable to prolong the lesions by weeks and months

In administering local treatment to a patient with contact dermatitis we should be guided by two principles (a) We must guard against an aggravation from irritating drugs and from new sensitizations which are liable to develop during the course of the treatment (b) The local treatment must be carefully individualized and adjusted to the need of each particular phase of the disease

Guarding against New Sensitizations *Preliminary Test Applications of Drugs* No local medication should be employed on a patient without preliminary application of a small amount of the material upon a limited area of the skin If the medication is too irritating or too concentrated burning and pain originate within ½ hour If sensitivity exists to one or more ingredients of the preparations which have been applied itching at or near the test area may become noticeable within a short time becoming more intense within one or two days The fact that a medication has been tolerated before is no safeguard against the possibility of sensitivity at a later time Sensitization to previously harmless drugs is especially liable to develop when the medication has been interrupted and is resumed after an interval of 10 days to several weeks (Table XIV)

Avoidance of Protracted Medication No medication should be used without a check on whether or not it can still be tolerated A local treatment can be harmless for a week or two and then for some unexplained reason may begin to aggravate the lesion Especially in patients subject to allergic diseases the skin seems to be much more irritable than in normal persons and strong concentrations of otherwise harmless medications may cause great damage Some dermatologists have made it a practice never to start a medication in concentrations higher than 3% Menthol and camphor should not be used in concentrations higher than 5%

Individualization of Local Treatment The decision as to what local treatment to apply depends largely on the individual state of the lesion and on the patient's required need for relief It may be necessary to relieve itching to control pain from fissures of the skin to counteract excessive weeping to relieve excessive dryness and to control a superimposed secondary infection For instance when there is a great deal of weeping and exudation of fluid from the lesions it would be wrong to apply an ointment which would interfere with the elimination of the secretion and the natural tendency toward healing Furthermore to cover such a weeping area with an ointment might give rise to the development of infection underneath the ointment In the same patient however skin stimulating and emollient ointments are indicated when the eruption appears dry fissured and painful It is a good rule to be guided

by the principle The wetter the lesion the wetter the treatment the dryer the lesion the dryer the treatment

Acute State The very acute state in a dermatitis is characterized by [illegible]ked erythema itching and exudation For its relief continuous sooth[illegible] [illegible]mpresses and baths are the method of choice The patient should [illegible]ed that during this phase particularly any medication that burns [illegible] is liable to do great harm and should be immediately abandoned [illegible] the many materials which can be used potassium permanganate bath[illegible] concentration of 1 40 000 and boric acid compresses (1 to 2%) are my p[illegible]ference

Compresses Boric acid compresses should be ice cold and changed frequently The wet dressing should be covered with oiled silk or wax paper The edge of this covering should protrude by at least one inch above the dressing in order to prevent evaporation of the moisture Some suggest that the compresses be kept open and allowed to evaporate Upon drying they are to be moistened again This is believed to prevent excessive maceration of the skin However, there is the danger that the compresses may dry out and the gauze adhere to the skin thus inducing new traumatiza tion Following each removal of the compresses all detritus is removed from the skin by gently patting or cautiously rubbing it with a dry towel This results in breaking of the bullae and creates a pleasant subjective sensation in the patient similar to the one which he associates with scratching If care is taken that the skin is not traumatized in this manner the cleans ing and removal of dead tissue is of great benefit

Other medications useful for compresses are Burow s solution (liq alum acetate) in a concentration of 1 16 or liquor alum subacetate 1 50 An excellent prescription which is very soothing and pleasant is as follows

℞		
	Menthol	0 06
	Boric Acid Solution	3 00
	Burow s Solution	10 00
	Witch Hazel q s ad	240 00

Sig Dissolve oz I in oz IV of ice water for compresses

Some patients obtain a great deal of benefit from compresses with a table-spoon of vinegar dissolved in a quart of iced water Some have used milk for compresses in acute cases Weak solutions of silver nitrate ($\frac{1}{8}$ to $\frac{1}{4}$%) exert a slightly cauterizing effect on the skin This is useful when there is pain where the skin has been scratched open They also prevent secon dary infection

Baths The action of potassium permanganate baths is antipruritic as well as slightly disinfectant We should guard against making the solution too strong and thus irritate the skin A light violet color in the solution

obtained by dissolving* one or two one grain tablets in the bathtub is preferable to stronger darker solutions The brown stain on the skin from the oxidation of the solution, can be removed by oxalic acid or lemon juice

Some patients prefer colloidal† baths with starch, bran or oatmeal Others like to alternate the ingredients of the bath, taking a colloidal bath in the morning and a permanganate bath in the evening At no time should soap be added to the bath water, because it irritates the lesions regardless of the state in which they are

The drying of the lesions can be accelerated by carefully gauged doses of cold quartz light, ultra violet ray or infra red light, starting with exposures below a mild erythema dose A regular light bulb placed over the exudating area for ½ to 1 minute twice daily will serve the purpose The sensitive lesions are easily susceptible to burns, we should therefore warn against indiscriminate and careless applications of light treatment

For soothing a lesion during the acute state and on areas where the application of a wet dressing is impossible or impractical, the following shake mixture is advised

℞			
	Zinc Oxide		
	Glycerin	aa	45 0
	Olive Oil	ae	20 0
	Water	Ad	200 0

Sig Shake well before applying ‡

Subacute State. After the weeping has subsided the skin begins to dry up It becomes covered with scales and crusts Painful irritating fissures may appear near the joints and on the neck from stretching of the drying, tender skin Evidence of secondary infection begins to appear from frequent scratching Since itching is still the most annoying symptom in this state, mild anti pruritic lotions which contain menthol or phenol with its slightly disinfectant effect are indicated The following lotion will serve

* If the tablet is first dissolved in a glass of water and this solution then added to the bath water the tub is less likely to become stained

† [illegible]

oatmeal (E Fougera Co Inc)

‡ Drying and fissuring of the lesion precedes healing and is therefore desirable no matter how unpleasant to the patient Covering these areas with ointments in this stage may give rise to infection and new aggravation The patient should be advised not to use ointments too freely

this purpose provided it has first been ascertained by a test application that the patient is not sensitive to phenol

℞ Calamine preparation			
Zinc oxide	aa	2 oz	(60 0)
Phenolis		15 m	(1 0)
Mentholis		10 gr	(0 6)
Glycerin		2 oz	(60 0)
Aq hamamelidis	q s ad	8 fl oz	(240 0)

Sig Apply locally every 1 to 2 hours

For a cooling and soothing effect the following preparation is useful

℞		
Bismuth subnitrate		2 00
Zinc Oxide		
Liquor calcis	aa	4 00
Acquae Rosae	ad	120 00

Sig Apply to skin two or three times daily

In addition to soothing lesions which are drier and less acute require slight stimulation which is afforded by the following ointment

℞		
Ichthyol		1 8
Zinc oxide		15 0
Yellow Petrolatum	ad	60 0

Sig Apply thickly bandage remove with olive oil and re apply b i d

For lesions which are more protracted the following prescription may be considered

℞	
Naphtex	3 00
Burow s Solution	10 00
Lanolin anhyd	20 00
Zinc oxide	6 00
Talcum	6 00
Petrolati q s ad	60 00

A soothing application especially useful when the genitals are affected is wet dressings with the following mixture

℞		
Phenol	15 m	(1 0)
Tragacanth	1 drachm	(4 0)
Olive oil	2 oz	(60 0)
Lime Water	1 fl oz	(30 0)

Again it should first be ascertained by a temporary application on a test area that the patient is not sensitive to phenol and tragacanth This solution is applied by means of cotton pledgets placed around the genitals A

suspensory lined with oiled silk will protect the sensitive areas from friction with clothing

Daily cleansing and medicated baths are indicated in this state Some patients are benefited by alternating potassium permanganate baths with mild tar baths They are prepared by adding 2 to 4 tablespoons of Almay Tar* to a tubful of water, after it has been ascertained that the patient is not sensitive to tar After the bath a 3% boric acid ointment or the following ointment should be applied in order to counteract the drying effect which the bath exerts on the skin

℞ Boric acid	0 2
Greaseless base	60 0
White petrolatum q s ad	90 0

Before each application of a medication the skin should always be gently but thoroughly cleansed of detritus grease, and dried secretion in the manner outlined above

Chronic Dermatitis In the more persistent and chronic cases of dermatitis the lesions become drier, crusty, more thickened and lichenified In this state stronger "reducing' medications are indicated, the most important of which are coal tar, salicylic acid (3% to 10%) and resorcin (3% to 10%)

The following prescriptions are among the list of ointments recommended by Sulzberger [181]

℞ Coal tar N F VI	1 3 3 0
Salicylic acid	1 3-3 0
Lanolin	
Petrolatum aa	ad 30 0

Salicylic acid	2 0 to 10 0
Chrysarobin	2 0 to 10 0
Birch tar	2 0 to 5 0
Soft soap	5 0 to 10 0
Anhydrous Lanolin	25 0

My own preference for this condition is an ointment consisting of 3 to 5% liquor carbonis detergens in Lassar's Paste or zinc paste Salicylic acid or Resorcin can be added to this, if keratolytic action is indicated because of excessive thickening and crusting The concentration of these drugs in the ointment varies from 3 to 10% The higher concentration being designed for the thickened lesions Crude coal tar 0 25 to 2% or Ichthyol 3 to 10% may be substituted for liquor carbonis detergens A chronic form of dermatitis may occasionally respond surprisingly well to bactericidal measures *i e*, gentian violet, vioform or antibiotics as discussed below *

*Almay Pharmaceutical Corp Schieffelin and Co, Distributors

Another very effective though somewhat unconventional measure is the application of a poultice with buttermilk and oatmeal. This is both soothing and acidifying to the skin.

Control of Secondary Infections: Like in the acute and subacute state, secondary infection may necessitate the employment of bactericidal measures.

A medication with a definite bactericidal action which has been used extensively in recent years is vioform. It is usually administered in the form of a 3% Vioform ointment (Ciba) for subacute and chronic lesions and as a powder if the lesions are in the exudative state. Bacitracin, Neomycin, Terramycin and Aureomycin ointments in 3% concentrations have been most useful in the control of secondary infection. They differ from other antibiotics by the fact that they are not as likely to sensitize the skin.† I have completely abandoned the topical use of penicillin, streptomycin and sulfa drugs because they have produced a high incidence of sensitization in my patients. Compresses with penicillin solution have been particularly harmful.

Only rarely do we resort to the old standby, ammoniated mercury (½ to 2%) because of the efficacy of the new antibiotics and since sensitization to mercury is not infrequent. Iodides and bichloride of mercury should be strictly avoided. A summary of the important local measures is presented in Table XVI.

General Measures

Certain general therapeutic measures aid in relieving the patient's symptoms and contribute to shortening the course of the disease. It is sometimes very difficult to arrive at an unbiased judgment concerning the

* At a recent meeting of the Academy of Allergy J. D. Goldstein, Jersey City, reported favorable results from the use of Hyaluronidase in atopic eczema. This is incorporated in an ointment base for the purpose of spreading useful medications such as epinephrine or antihistaminics over the diseased area. His formula which I have found of value in chronic cases of dermatitis is as follows:

Basic ointment			To basic ointment add	
Stearic acid	30	gm	Hyaluronidase	450 Units
Glycerin	30	gm	(Wyeth)	
Sod. Boros	0.526	gm	Epinephrine 1:100	10 cc
Sod. Benzoate	0.2	gm	Crystalline Theophorin	
Pot. Carbonate	1.06	gm	5% of total mix	
Water q.s. ad	200			

KEEP REFRIGERATED

Sig. Apply to local skin areas as necessary.

Like in all new medications the possibility of sensitization should be borne in mind. Another recent addition to this mode of therapy is the application of a 1:500 epinephrin ointment in a petrolatum base prepared according to the method of H. A. Abramson. It is rubbed into the affected area.

† I have recently encountered sensitivity with local application of every one of these agents.

TABLE XVI

SUMMARY OF LOCAL TREATMENT OF CONTACT DERMATITIS PREFERRED BY THE AUTHOR

1. In all cases except when the skin is unusually dry

    Potassium Permanganate baths
    Colloidal baths

2. For acute vesicular exudative lesions with marked erythema

    Potassium Permanganate baths
    Colloidal baths

    Ice cold compresses with solution of aluminum subacetate (diluted 1 15 or 1 30)

    3% Boric acid solution

3. For subacute dermatitis with tendency to dryness

    Mineral Oil
    Johnson's Baby Oil
    Olive Oil

4. For healing and drying lesions

    Liquor carbonis detergens (3%) in Lassar's paste
    Salicylic acid in petrolatum or in greaseless ointment base
    Boric Acid in petrolatum (3%)
    Silver nitrate Sol 1% applied to excoriations

5. For acute and subacute, infected lesions

    Aureomycin, Bacitracin, or Terramycin ointment
    Gentian violet 3% solution, applications every 3 to 4 days
    Vioform cream 3%
    Silver nitrate Sol 1% applied to excoriations after mechanical removal of crusts

6. For chronic crusty thickened areas

℞	Liq carb detergens	1 5
	Zinc oxide	2 0
	Amyli	2 0
	Petrolatum	30 0
℞	Acid salicylate	1 5
	Crude coal tar	3 0
	Lassar's paste q s	30 0
℞	Chrysorobin	1 0
	Salicylic acid	1 5
	Ichthammol	2 0
	Petrolatum q s	30 0

℞ Crude coal tar applied in full strength

Another very effective though somewhat unconventional measure is the application of a poultice with buttermilk and oatmeal This is both soothing and acidifying to the skin

Control of Secondary Infections Like in the acute and subacute state, secondary infection may necessitate the employment of bactericidal measures

A medication with a definite bactericidal action which has been used extensively in recent years is vioform It is usually administered in the form of a 3% Vioform ointment (Ciba) for subacute and chronic lesions and as a powder if the lesions are in the exudative state Bacitracin, Neomycin Terramycin and Aureomycin ointments in 3% concentrations have been most useful in the control of secondary infection They differ from other antibiotics by the fact that they are not as likely to sensitize the skin † I have completely abandoned the topical use of penicillin streptomycin and sulfa drugs because they have produced a high incidence of sensitization in my patients Compresses with penicillin solution have been particularly harmful

Only rarely do we resort to the old standby, ammoniated mercury (½ to 2%) because of the efficacy of the new antibiotics and since sensitization to mercury is not infrequent Iodides and bichloride of mercury should be strictly avoided A summary of the important local measures is presented in Table XVI

General Measures

Certain general therapeutic measures aid in relieving the patients symptoms and contribute to shortening the course of the disease It is sometimes very difficult to arrive at an unbiased judgment concerning the

* At a recent meeting of the Academy of Allergy J D Goldstein Jersey City reported favorable results from the use of Hyaluronidase in atopic eczema This is incorporated in an ointment base for the purpose of spreading useful medications such as epinephrine or antihistaminics over the diseased area His formula which I have found of value in chronic cases of dermatitis is as follows

Basic ointment			To basic ointment add	
Stearic acid	30	gm	Hyaluronidase (Wyeth)	450 Units
Glycerin	30	gm	Epinephrine 1 100	10 cc
Sod Boros	0 526	gm	Crystalline Theophorin 5% of total mix	
Sod Benzoate	0 2	gm		
Pot Carbonate	1 06	gm		
Water q s ad	200			

KEEP REFRIGERATED

Sig Apply to local skin areas as necessary

Like in all new medications the possibility of sensitization should be borne in mind Another recent addition to this mode of therapy is the application of a 1 500 epinephrin ointment in a petrolatum base prepared according to the method of H A Abramson It is rubbed into the affected area

† I have recently encountered sensitivity with local application of every one of these agents

Control of Atopic Factors In discussing treatment in the chapter Special Situations it has been emphasized that allergic management is extremely important in atopic patients with contact dermatitis If patients with contact dermatitis are refractory to treatment after the causative agents have been removed with reasonable certainty a comprehensive intra dermal skin testing program should always be carried out I believe that the value of skin tests is much underrated This is due to the fact that very few clinicians are in a position to employ fresh extracts Even in well known allergy clinics extracts are not renewed often enough to be reliable If *extracts are kept outside of the refrigerator during mid summer for only a* few hours their potency is greatly impaired and testing with these extracts is inconclusive A diet based on properly done intradermal tests is effective in individuals with contact dermatitis if they are *food sensitive In other* atopic patients a few injections of extracts of pollen and other inhalants may establish prompt relief of a contact dermatitis which has failed to respond to other measures

Premenstrual Aggravation In rare cases of chronic contact dermatitis in women who suffer aggravation of the lesions premenstrually consider able improvement results from one to two injections of progesterone or proluton administered during the week before the menses This should be combined with a diet low in salt and oral doses of ammonium chloride in order to control the accumulation of fluid in the system which prevails at this time

Violet Ray During the acute and subacute state violet ray treatment may be used in moderate doses It aids in drying up the oozing areas and through its bactericidal effect it may retard infection

Roentgen Ray Roentgen Ray treatment is used extensively by many clinicians especially when the lesions are thickened and lichenified It is administered in ¼ erythema doses in four or five exposures It relieves itching and hastens involution of the lesions Cases which have been refractory to local measures may benefit from x ray treatment Relief how ever is usually limited to a short period of time If the treatments are re peated too often and given in too large doses permanent damage to the skin may ensue X ray therapy should therefore be employed only when the patient s discomfort necessitates this therapy It is definitely contra indicated in acute dermatitis It should only be administered by compe tent Dermatologists

Sedation Some clinicians are placing great emphasis on sedation There is no doubt that certain individuals with dermatitis are in need of sedation their nerves" having been overtaxed by the constant discom fort and pain and itching for weeks or months Barbiturates are probably the least harmful sedatives from the standpoint of developing drug sensi tivity It is a bad practice to permit these patients to use the drugs indis

criminately thus risking addiction to them Opiates should always be strictly avoided

Antihistaminics: I am not in favor of the routine oral administration of antihistaminics They are occasionally indicated in single doses for relief of excessive itching and for sedation A number of my patients developed hives from their continued use On several occasions I observed that a final cure of the dermatitis was definitely retarded by routine administration of anti-histaminics Furthermore, when these drugs are applied topically as well, there is danger that the patient may develop sensitivity to them and that new areas of dermatitis develop *

Focal Infection: Some clinicians feel that healing of a chronic dermatitis can be delayed because of a focal infection present in teeth, sinuses, prostate, gall-bladder, hemorrhoids, etc If we assume this to be the case, a therapeutic trial with oral or parenteral antibiotics is indicated The fact that the skin eruption improves following antibiotic therapy may assist *us in making a decision on whether or not surgical removal of such a* focus of infection is indicated

Cortone and ACTH. The value of Cortone and ACTH has now become sufficiently explored for passing judgment on their efficacy in dermatitis They lead to accumulation of fluid in the tissues From the theoretical point of view this might interfere with healing during the acute state when there is often considerable edema in the affected skin Furthermore, they are known to retard healing of wounds and to encourage infection However, in most cases, acute and chronic ones as well, their administration produces startling results With the cessation of the treatment the lesions return promptly In other cases ACTH and Cortone are a complete failure It is certain that they do not "cure" a dermatitis as long as the causative agents remain in contact with the skin In very acute and severe cases, such as in exfoliative dermatitis they should always be given a clinical trial Because of their well known unfavorable side effect, they should be employed for not longer than five to 10 days They should be adminis tered more sparingly in young children At no time should they be considered a shortcut to the solution of a case by careful clinical investigation and the utilization of other therapeutic procedures

A treatment which may act through stimulation of adrenal cortex and liberation of its hormones is the time honored fever therapy by intravenous injections of milk or typhoid vaccine This has lately been revived by the introduction of Pyromen (Baxter), a bacterial product for intravenous injections My experience with this method has not been as favorable as with Cortone and ACTH

* In Dr E Sidi s clinic in Paris France, I recently observed an unusually high incidence of sensitivity to local application of Phenergan

Appendix I

Principal Contact Agents and Other Contributing Irritants to be Considered in Various Occupations

(Compiled by Dr Karl Merkle from Schwartz and Tulipan.[159])

Agricultural Laborers and Market Gardeners: Poisonous plants and woods, artificial fertilizers, insecticides, animal hair

Artists, (Painters, Sculptors): Turpentine, thinner, calcium sulphate, lead, oxalic acid, linseed oil, camel's-hair brushes

Aviators: Insecticides sprayed by planes, lead, arsenic, toxic gas, gasoline

Bakers· Spices, sugar, vanilla, lemon, cinnamon, wheat, flour conditioners Consider flare-ups from simultaneous sensitivity to these foods

Barbers, Cosmeticians Soaps, shampoo preparations, dyes, hydrogen peroxide, rubber gloves, permanent-wave setting solution, colocynth used as denaturant in alcohol

Bookbinding Industry: Glue, shellac, inks, coloring materials

Boot and Shoe Manufacturers: Organic dust, ammonia, amyl acetate, benzene, benzol, mercury paste, nitro benzene

Brooms and Brushes· Various kinds of woods, celluloid, metals, lead bleaching materials

Building, Construction Earthy bases of calcium, sulphuric acid, alumina in cement, lime dust, cement, aniline dyes, chromium compounds, arsenic, lead, ammonia, turpentine

Road Builders. Tar asphalt, bitumen, coal tar, cement

Butchering, Slaughtering and Meat Packing Industries: Animal hair, dermatomycoses

Button Manufacturing Ivory and horn dust, calcium carbonate, wood, brass, nickel, iron, gold, silver, paper, celluloid

Candy Manufacturing: Starch, foil and paper, cord, granulated sugar, oils used in flavoring oil of cassia, peppermint, orange peel, lemon peel, anise, cloves, oil of birch, extract of vanilla, citric acid, tartaric acid, chocolate, pineapple, citrus fruits, cashew nuts, calcium chloride

Canning and Food Preserving Industries· Irritating juices and essential oils, dyes, preservatives, insecticides, kerosene, soaps, mustard, vinegar, helvellic acid, lead, rubber, resin, benzene, commercial lacquer, gasoline sulphurous acid, copper sulphate

Clerks and Office Workers: Aniline-colored pencils, glue, carbon paper, typewriter ribbon, dust, desk pads (rubber, plastic).

Dairy Workers: Primrose rash, ragweed (handling udders of cows), cow hair, borax, alkaline substances

Diesel Motors: Sodium bichromate in radiator fluid

Disinfectants and Fumigants: Acetaldehyde, alum, aluminum chloride, ammonia, aniline colors, bromines, calcium chloride, chlorine, cresol, creosote, essential oils, formaldehyde, hydrochloric acid, hydrocyanic acid, lead, methylated spirits, mercuric chloride, nitronaphthalene, phenol, picric acid, pitch, resin, sodium carbonate, sulphur dioxide, sulphuric acid, tannin, tar, tar oil, turpentine, zinc chloride, zinc sulphate

Dock Laborers and Warehouse Men: Pads between shoulder blades (leather dye), dusts from grain, minerals, coal, lead, manganese, arsenic, calamine, artificial fertilizers

Dolls, Toys, and Advertising Novelties. Resin, glue, lead, lacquer, enamel, aniline colors, excelsior, amyl acetate and other solvents, wood, iron, copper, nickel, bronze, paper, bakelite, leather, fur, rubber

Dry Cleaning Industry: Glycerine, oleic acid, glacial acetic acid, petroleum, ether, chloroform, hydrofluoric acid, oxalic acid, denatured alcohol, benzene, naphtha-gasoline, turpentine, trichlorethylene, carbolic acid, nitrobenzene, amyl acetate, carbon tetrachloride, strong alkali, benzene soap, ammonia

Electric Apparatus Manufacturer· Carbon monoxide, sulphur, arsenic, bakelite, rubber, acetone, benzene, benzone, hydrochloric acid, lacquer, mercury, resin, sulphuric acid

Feather Industry. Aniline dyes, arsenic, glue, sulphur dioxide, hydrogen peroxide, soap, benzene, turpentine methyl alcohol

Felt Hat Manufacturer: Nitric acid, sulphuric acid, aniline dyes, chrome, gum, shellac, sodium carbonate, alcohol

Fireproofing. Copper, brass, glue, resin, benzene, sharp dust particles, chlorinated naphthalene, tar, lime

Fish Industry. Fish Scales

Florists: Plants, manures, fertilizers, insecticides, dyes of ribbons and other decorative articles

Artificial Flower Industry: Lead chromates, arsenic, picric acid, methyl alcohol, benzene, carbon tetrachloride, chrome colors, rubber solution, varnishes

Flour and Grain Industry: Dust, sulphur dioxide, chlorine

Glue Manufacturer: Hydrochloric acid, nitric acid, sulphur dioxide, formaldehyde, bichromates, resin, shellac, benzene, acetone, turpentine, ammonia, lime, caustic soda, alum, borax, tannic acid, glycerine, shale oil, zinc sulphate, lead, litharge, nitrous and other acid fumes, fatty acids, arseniuretted and sulphuretted hydrogen, mercaptan

Ink: Aniline dye, turpentine, cashew nut oil, chromates.

Garages, Automobile Repair Shop, Chauffeurs. Oil, grease, kerosene, benzene, gasoline, lead, tetraethyl, potassium cyanide, impure petroleum, antifreeze

Garment and Millinery Industries: Dyes, iron, tin, antimony, aluminum, lead, zinc, copper, turpentine, benzene, methyl alcohol, carbon tetrachloride, salts of chromium.

Groceries and Delicatessens: Dyes of labels, citrus fruit rinds, insecticides, insect sprays, cardboard boxes, paper bags, dry ice

Hotels, Restaurants: Boric acid, sulphurous acid, sulphites, borax, salicylic acid, formaldehyde, disinfectants, fungicides, insecticides, irritant oils, fruit juices, vegetables (asparagus, celery), caustic soaps, grease

Ice Cream Making. Fruits, nuts, flavoring and coloring materials, sugar

Electric Lamp Manufacturer: Mercury, ether, amyl acetate, methyl alcohol, nitric acid, hydrofluoric acid, copper, nickel, lime

Janitors: Polishing materials, arsenic, thallium, lead, benzene, hydrocyanic acid, oxalic acid, soap

Jewelry and Allied Industries: Platinum, ammonium hydroxide, nickel, nitric acid, hydrochloric acid, sulphuric acid, potassium cyanide, lead, shellac, resin, nitric acid (in manufacturing precious stones), amyl acetate, nitric acid (for artificial pearls), cyanide, chrome, enamel lacquer, alkalies nitrous fumes, soap soda, trichlorethylene, radio-active substances, mahogany, ebony, walnut (in watches and clocks)

Truck Dealers and Wreckers: Lead, brass, bronze, zinc, benzene, sulphuric acid, lime, cement, lead, tar, creosote

Laundry Workers and Wash Women. Cocoanut oil soaps, starch, bleaching powder

Lumber and Woodworking Industries. Brazilian walnut, creosote, zinc chloride, mercury chloride, chlorphenols, plaster of Paris, diphenyl, tar oil, creosote oil, zinc chloride, aniline colors, cocobolo wood, glue, diphenylchlorarsin, chlorophenols, arsenic, amyl acetate, oxalic acid, syllect (Indian varnish), cellulose varnishes, lead, maracaibo boxwood, African boxwood

Machinery Manufacture: Oil, cyanogen compounds, nitric acid, yellow ochre, Viennese chalk, oxide of iron, putty powder, methyl alcohol benzene, turpentine, slaked lime, hydrochloric acid, oxalic acid, nickel sulphate, potassium cyanide, zinc chloride chromates, beryllium

Match and Match Box Industry. Red phosphorus, phosphorus sesquisulphide, chlorate, red lead, chromium compounds

Medical and Allied Professions. Novocain, pantocaine, formaline rubber, plaster of Paris, cocaine, procaine hydrochloride, mercury, formaldehyde, phenol, cresol, thymol, wood alcohol ethyl silicate, apothesine, butyn borax epinephrine, mercury, sublimate chromates, arsenic salts, fumes of formaldehyde,

sulphur, carbon tetrachloride, phenylhydrazine, arsenious acid, strychnine, brucine, atropine, apomorphine, morphine, codeine, opium, quinine, emetine, arnica, cantharides, hydrogen peroxide, iodine

Mirrors: Ammonia, formaldehyde, essential oils of cloves, thyme, camomile, glucose, resins

Musical Instruments, and Musicians: Irritating woods (see Table IV), lead, hydrogen peroxide, sulphuric acid, sodium peroxide, calcium chloride, glacial acetic acid, benzene, methyl alcohol, turpentine, resin-pitch mixture, cocus wood

Pastry Cooks. Glucose, essential oils of citrus fruits, vanilla, cashew nut oil, nitrobenzol, angelic acid, cinnamon

Pencil and Crayon Manufacture. Aniline and chromium compounds, saw dust of red cedar wood, waxes, gums, glue

Plumbing, Gas, and Steam Fitting: Lead, hydrochloric acid, zinc chloride, tetraline

Pulp Paper and Paper Products: Arsenic and its compounds, arseniuretted hydrogen, sulphuretted hydrogen, chlorine, formaldehyde, hydrochloric acid, sodium hydroxide, sulphuric dioxide, sulphuric acid

Putty Manufacture. Lead, linseed oil, benzene, benzol, carbon disulphide, antimony sulphide

Rice Field Workers: Weed "Naia-major and minor"

Rope and Cordage Manufacture: Sodium hydroxide, potassium hydroxide, dust, impure oils, dyes

Sheet Metal, Stamped and Enamel Ware: Amyl acetate, antimony and its compounds, arsenic and its compounds, benzene and its homologues, carbon disulphide, chromium and chromium compounds, hydrochloric acid, lead and its compounds, manganese, naphtha derived from coal tar for the preparation of colors, nitrous gases and nitric acid, quicklime, sulphuric acid and its fumes, tetrachlorethane, turpentine

Paper Box Manufacture. Moist glues and pastes

Spices and Flavoring Agents (Manufacture): Cinnamon, pepper, ginger, oil of *anise, mustard, vanilla, essential oils of citrus fruits,* oil of bitter almonds

Sporting Goods: Lead, rubber, nickel, chrome, leather, leather dyes

Stone Workers: Limestone, lime, stone dust, oxalic acid

Taxidermy: Lysol, arsenious oxide, chloride of lime, mercury chloride, tannin, calcined alum, gasoline

Theatrical Profession and Motion Picture Industry. Cosmetics, assorted woods, developer, dyes

Undertakers and Embalmers: Formaldehyde and other embalming fluids, mercury, carbolic acid, oil of cinnamon, oil of cloves, thymol

Waterproofing: Resin, sodium carbonate, rubber, chrome, glue, alum, potassium bichromate, chromium fluoride, chrome alum, turpentine, yellow wax, ground-nut oil, iron sulphate, essence of thyme, shellac, amyl-acetate, cresote oil

Window Shades and Venetian Blinds: Benzene, benzol, paint, shellac

Wool: Alkali solutions, black dye (paraphenylenediamine), mineral oil, wool

Appendix II

Preparation of Poison Ivy Extract

Spread a small bagful of fresh ivy leaves on a table, let it dry over night, place in incubator for a few hours Extract in 10 volumes by weight of absolute alcohol for three days Filter through ordinary filter paper and dilute with absolute alcohol to 1 10, 1 20 1 30 1 50, 1 100, 1 500 and 1 000

The following is a method for the production of a poison ivy extract which can be injected subcutaneously in any amount without pain This is the alum-precipitated pyridine extract of poison ivy as recommended by Strauss and Spain [180]

Poison ivy is ground into a fine meal It is mixed with pyridine in a proportion of 10 grams in 100 cc of pyridine The mixture stands in the ice box over night and is filtered to separate the leaves from the extract 40 cc of this solution is added to 100 cc of distilled water in a sterile centrifuge cup 40 cc of sterile 0 25 N sulfuric acid solution containing 2 per cent potassium alum by weight is then added slowly with constant shaking The cup is now capped with a sterile stopper and allowed to stand over night in the ice box This is then centrifuged and the supernatant removed The sediment is washed four times with 200 cc of sterile physiological saline containing 0 4 per cent phenol Enough phenolized sterile saline is added to the sediment to bring the total to 40 cc Further dilution of the stock material is accomplished with sterile saline containing 0 4 per cent phenol

Preparation of Pollen Oil

The ether-soluble fraction is removed by adding to a measured amount of dry pollen an equal part of ether This is covered with acetone and let stand for one hour After shaking thoroughly this suspension is filtered through paper, leaving the pollen granules as residue The ether is evaporated from the remaining fluid which leaves the fat soluble residue This is then re-dissolved in acetone This forms the "concentrated solution' from which serial dilutions are made in almond oil Patch testing is to be done either with the concentrated extract or, in a very acute case, with a 1 10 or 1 100 dilution of almond oil Treatment is to be commenced with the dilution which gives a mildly positive reaction on patch testing

Control of Poison Ivy Plants

Control of poison ivy is easily and inexpensively effected by spraying the plants with a solution of one ounce 2-4D in 8 gallons of water All leaves of the plants must be reached by the spray, but not as extensively as to make the fluid

drip down It may take ten to twenty days until the plant dies. The best months to apply the spray are May, June, and July. If rain occurs within four hours after treatment, the spraying should be repeated. Another spraying with 2-4D is necessary if the ivy is still green three weeks after the first application

Appendix III

Glossary

(For non-medical readers.)

Abrasion	A circumscribed removal of epidermis on skin or mucous membranes
Achlorhydria	Absence of hydrochloric acid from the gastric secretion
Acneiform	Resembling the "pimples" of the common skin eruption, acne
Affinity	Chemical attraction
Allergic	"Reacting differently", pertaining to allergy
Allergy	Altered reactivity, "hypersensitivity" to otherwise harmless substances which are eaten, inhaled, injected, or reach the body tissues through infection
Anaphylactic	Pertaining to anaphylaxis
Anaphylaxis	A type of extreme sensitivity formerly believed to occur in animals only, following reinjection of a protein substance to which the animal has been made sensitive through a previous injection. Some use this term to indicate a severe state of allergy in humans, suddenly induced by injection, inhalation or ingestion of substances to which extreme sensitivity exists
Antibody	A substance either harmful or protective, which originates in the system resulting from presence of antigen. It is found in the blood stream or in the body tissues
Antigen	A substance that causes the formation of antibodies
Antiscabetic Ointment	An ointment used for treatment of scabies
Atabrin	A drug for treatment of malaria
Atopic	"Out of place," pertaining to atopy
Atopy	A form of allergy or hypersensitiveness occurring in man. It comprises such diseases as hayfever, asthma and infantile eczema, which show a tendency to be transmitted through inheritance. Its characteristic lesion is the hive

Bacteriostatic	Counteracting bacteria
Bilateral	On both sides of the body
Biopsy	Diagnostic examination of a piece of tissue removed from a living subject
Blepharitis	Inflammation of the eyelids especially their margins
Bullous	Characterized by bullae or large water blisters
Cervicitis	Inflammation of the cervix the lower portion of the uterus
Cheilitis	Inflammation of the lip
Cocobolo Wood	A wood used in the manufacturing of kitchen utensils knife handles etc
Clitoris	An organ at the anterior angle of the vulva
Colloidal	Consisting of colloid a substance such as gelatine the molecules of which are too large to pass through an animal membrane
Condyloma	A wart like eruption near the anus or vulva
Conjunctivitis	Inflammation of the conjunctiva *i e* the mucous membrane covering the inner surface of the eyelids
Connective Tissue	Supporting or uniting tissue of the body
Contact Dermatitis	A disease principally localized in the epidermis resulting from external contact with a substance to which the individual is sensitive
Corium	The deeper of the two layers of the skin
Cornification	Conversion into horn a horny substance or tissue
Cutis	Latin term for skin
Cystitis	Inflammation of the bladder
Dermatitis	"Inflammation" of the skin
Desensitization	The reduction or abolition of sensitivity by a series of injections gradually increasing in strength
Dialysis	The separation of crystalloid from colloid substances in a solution by placing an animal membrane between the solution and pure water
Diathermy	Treatment for increasing the temperature in body tissues by means of high frequency current
Diffusion	The process of spreading about or scattering
Dilatation	The process of stretching beyond normal dimensions
Dorsal	Relating to the back
Duhring s Disease	Dermatitis herpetiformis A chronic disease of the skin marked by an intense itching The lesions tend to occur in groups

Electrocardiogram	A graphic representation of the electric currents which induce contraction of the heart
Endothelial Cells	Flat cells which make up the endothelium
Endothelium	Membrane that lines the cavities of the body It consists of a single layer of thin flat cells
Epidermis	Outermost non vascular layer of the skin
Epidermophyton	A fungus (mold) similar to Trichophyton It does not invade the hair follicles
Epidermophytosis	Ringworm An itching infection of the skin usually on the toes and feet caused by the fungus epidermophyton
Epidermolysis Bullosa	A hereditary condition of the skin in which large blisters are produced by slight mechanical irritation
Erysipelas	An acute inflammation of the skin and subcutaneous tissues due to a streptococcus
Erythema Nodosum	A skin disease marked by formation of painful nodes especially on the shin and forearm
Erythema Multiforme	An acute febrile disease accompanied by headache joint pains and by an eruption of multiform appearance characterized by nodules or papules in the shape of rings patches etc
Estrogenic	A gland product causing estrus or heat in animals menstruation in woman
Etiology	Causation of a disease
Exacerbation	Increase in severity of a disease or its symptoms
Excoriation	Superficial loss of skin often due to scratching
Exfoliation	Stripping off in layers or sheets
Exfoliative Dermatitis	An acute inflammation of the skin with flaking off of the skin
Exudation	Outpouring of fluid from the circulation to the body surface or into a cavity
Fibrin	Whitish protein material which precipitates from blood and serous fluids
Filament	A delicate fiber or thread
Fistula	A duct resulting from broken down tissue often leading to an internal hollow organ
Folliculitis	An inflammation of the follicles the outlets of sweat and grease glands located near the roots of the hair
Fungicidal	Agent that destroys fungi
Fungus	A cellular organism feeding on organic matter a mold
Glossitis	Inflammation of the tongue

Glycosuria	Excess of sugar in urine
Granuloma	A circumscribed collection of epitheloid cells and leucocytes around a point of irritation
Hematogenous	Derived from, or transported by the blood
Hemoglobin	The coloring matter of the red blood corpuscles
Hemogram	The result of examination of the cellular constituents and hemoglobin of the blood
Herpes Simplex	A skin eruption marked by the occurrence of one or more deep blisters, usually located on lips
Histological	Pertaining to the minute structure and composition of the body tissue
Homogenous	Of similar or the same origin, uniform
Hydrogen Ion Concentration	The relative proportion of positively charged hydrogen atoms in a solution, an index of its acidity
Hyperkeratosis	Circumscribed overgrowth of the horny layer of the skin
Hypomenorrhea	Less than normal menstrual flow
Hypothenar	The fleshy mass at the inner (little finger) side of the palm
Idiopathic	Self originated, without known cause
Immunization	The process of rendering immunity or protection against harmful antigens
Incubation Period	*The time* between the implantation of an *infectious* disease and its first manifestation
Induration	Hardening An area of hardened tissue
Inguinal	Relating to the groin
Intracardial	Within the heart
Intradermal	"Between" (intra) the two layers of the skin Used in connection with injections
Intraperitoneal	Situated within the abdominal cavity, which is lined by a membrane called peritoneum
Intrapulmonary	Within the lung
Keratinization	The outer layer of the skin becoming thickened or "horny"
Keratinous	Horny
Keratoid	Marked by keratosis, *i e*, thickening of the superficial or horny layer of the skin
Keratolytic	Dissolving "horny" material, *i e*, counteracting formation of scales

Term	Definition
Kraurosis	Chronic disease of the vulva marked by shrinkage itching and dryness
Leucocytosis	Increase of white blood cells in the blood
Leukoplakia	A skin disease characterized by a whitish thickening of the epithelium of the mucous membranes
Lichenification	The conversion of an eruption into a form resembling lichen This is a disease of unknown origin simulating dry eczema
Lichen Planus	An inflammatory skin disease with wide flat papules often very persistent occurring in circumscribed patches
Lichenoid	Lichen like" A skin eruption which through rubbing and scratching has become thickened leathery with mosaic like surface
Lymphadenitis	Inflammation of lymph glands
Lymphadenoma	Benign swelling of lymphoid tissue
Lymphadenopathy	Disease of the lymph glands usually causing swelling and pain
Lymphocytes	One of the two main types of white blood cells the other being the polymorphonuclear cells
Maceration	Softening by action of a liquid
Metabolism	The process by which living substance is produced and torn down through assimilation of chemicals into body tissues and through their dissimilation into waste products This is accompanied by the release of energy
Metacarpophalangeal	Relating to the area where the metacarpi (the bones forming the hand proper) and the phalanges (the finger bones) join
Monilia	A yeast like fungus
Mordant	A substance such as alum used to make a dye or stain more permanent
Morphology	Dealing with the external configuration or the structure in animal and plant life
Mycosis	An infection with fungi
Mycotic	Pertaining to fungous infection (Mycosis)
Neoplasm	New abnormal formation usually applied to malignant growth
Oleoresin	A compound of an essential oil and resin present in certain plants

Papilla	Small nipple shaped elevation
Papillary	Pertaining to a papilla
Papule	Small circumscribed solid elevation of the skin
Papulo-Vesicular	An eruption marked by both papules and vesicles
Parakeratosis	Abnormal growth of the corneous layer of the epidermis
Patch Test	Skin test for contact sensitivity in distinction to intradermal or scratch test (for atopic sensitivity)
Pathology	Branch of medicine dealing with the structural and functional changes induced by disease
Perineal Region	The area between genital organs and anus
Perivascular	Occurring around blood vessels
Pernio	Frost bite
pH	Abbreviation for hydrogen ion concentration or acidity
Phenolphthalein	A crystaline substance employed as a reagent and as a purgative
Pityriasis Rosea	Common eruption consisting of superficial brownish or pink patches of varying size with whitish scales drying in center
Plantar	Relating to the sole of the foot
Plasma	Fluid portion of blood without red or white blood cells
Plaque	A patch or a small differentiated flat area on skin or mucous membranes
Polymorphonuclear	White blood cells or leucocytes with nuclei of varied forms
Postauricular	Behind the ear
Proctoscopy	Inspection of the lower bowels by means of a proctoscope
Proliferation	Exuberant growth by reproduction of similar cells
Pruritus	Itching
Psoriasis	A skin disease consisting of an eruption of circumscribed rounded patches of a red color covered by white scales Occurs chiefly on elbows and knees scalp and back
Purulent	Consisting of pus
Pustules	Blisters filled with pus
Pyogenic	Productive of pus
Pyuria	Pus in urine

Radial	Relating to the radius, a bone on the same side of the forearm as the thumb
Rectoscopic	Inspection of the rectum by means of a rectoscope
Refractory	Not readily yielding to treatment
Salicylate	A salt of salicylic acid widely used in the form of aspirin
Scabies	"The itch," caused by a parasite, the itch mite Sarcoptes Scabiei
Sclerosing	Inducing or undergoing sclerosis
Sclerosis	Hardening, scarring
Sebaceous Glands	Glands secreting a greasy lubricating substance
Seborrheic Dermatitis	An eruption of reddish patches covered with greasy scales, it occurs chiefly on face and scalp It gives rise to excessive dandruff
Stasis	Congestion in the flow of blood
Stroma	The framework, usually of connective tissue, of an organ, gland or other structure
Subcutaneous	"Beneath the skin," in distinction to intradermal "between" the two layers, and intramuscular "into" the muscle
Symptomatology	Systematic discussion of symptoms
Thenar	The fleshy mass on the palm below the thumb
Therapeutic	Pertaining to the treatment of a disease
Topical	Local
Traumatization	Injury to tissue
Trichomonas	Parasite consisting of a single cell occurring in the vagina
Trichophyton	A species of fungi (molds) causing ringworm
Ulnar	Relating to the ulna, a bone of the forearm on the same side as the little finger
Unilateral	Confined to one side
Uremia	Blood poisoning caused from insufficient elimination of waste products of the body
Urticaria	Hives
Vaginitis	Inflammation of the vagina
Venenata	"Venenum" poison, Dermatitis venenata or Ivy poisoning, the typical example of a contact dermatitis
Vesicles	A small circumscribed elevation on the skin, containing non purulent fluid

Vesiculation	Formation of small blisters
Vulva	External part of vagina
Wheal	A circumscribed elevation of the skin constituting the central portion of a hive, the characteristic manifestation of an allergic reaction

Bibliography

1 Anderson, R C Contact dermatitis from alfalfa and bur clover, *Arch Dermat & Syph* 5 201, 1914

2 Anderson N P Contact dermatitis, *Indust Med* 12 584, 1943

3 Andrews, G C Dermatitis venenata due to Quinacrine hydrochloride, *Arch Dermat & Syph* 50 140, 1944

4 Azerad and Grupper Traitment de l eczema infantile par les acides gras non satures, *Bull Soc franç de dermat et syph* 55 24, 1948

5 Baer, R L Examples of cross sensitization in allergic eczematous dermatitis, *Arch Dermat & Syph* 58 276, 1948

6 Baer, R L, Leider, M, and Mayer, R L Possible eczematous cross-hypersensitivity between paraphenylenediamine and azodyes certified for use in foods drugs and cosmetics, *Proc Soc Exper Biol & Med* 67 489, 1948

7 Baker K C, and White, C J An occupational dermatitis due to the inhalatation of trichlorethylene gas, *Indust Med* 15 389, June 1946

7a Ball C *The Rectum Its Diseases and Developmental Defects* London 1910

8 Bancroft, J Contact dermatitis due to hair lacquer, *Arch Dermat & Syph* 49 454, 1944

9 Bechet, P The patch test An evaluation of its possible dangers, *New York State J Med* 39 829, 1939

10 Bellach H Hypersensitivity to sulfapyridine, *Arch Dermat & Syph* 58 134, 1948

11 Bereston, F Personal communication

12 Berke, M, and Obermayer, M E Contact type sensitization to antibiotic agents, *J Invest Dermat* 11 253, 1948

13 Berman, D Personal communication

14 Black, J B, Thomas J W, Graham, W R, and Guerry, D Varied allergic reactions to penicillin, *Virginia M Monthly* 75 505, 1948

14a Blank, I H Action of Soap on Skin I Patch Test with Fatty Acids, *Arch Dermat & Syph* 39 811-824, (May) 1939

15 Bloch, B Role of idiosyncrasy and allergy in dermatology, *Arch Dermat & Syph* 19 175, 1929

16 ———, and Steiner-Wourlisch, A Active production of primula sensitivity in humans and its importance for the problem of idiosyncrasy, *Arch f Dermat & Syph* 152 283 1926

17 Boestron, G Hypersensitivity tests in professional eczema, their applicability and sources of error, *Acta Dermat -Venereol* 20 650, 1939

18 Brachman B Personal communication
19 Brinton H P Dermatitis cases reported among employed males and females in seven states *Industrial Med* 13 514 1944
20 Brown A Milford E L and Coca A F The nature and etiology of pollen dermatitis *J Allergy* 2 301 1931
21 Brunsting L A and Bailey R J Ragweed (contact) dermatitis pro duced experimentally in the guinea pig *J Allergy* 6 547 1935
22 Buie L A *Proctoscopic Examination and the Treatment of Hemorrhoids and Anal Pruritus* Philadelphia W B Saunders Company 1931 178 pp
22a Burckhardt W Neuere Untersuchungen Über die Alkaliempfindlichkeit der Haut *Dermatologica* 94 73 96 1947
23 Canizares O Personal communication
24 ——— Cutaneous diseases in army air force personnel *Arch Dermat & Syph* 56 364 1947
25 Cazort A Personal communication
26 Chase M W Inheritance in guinea pigs of the susceptibility to skin sen sitizations with simple chemical compounds *J Exper Med* 73 711 1941
27 Charpy J La therapeutique des eczemas infantiles par l association acides gras non satures pyridozine *Bull Soc franç de dermat et syph* 55 117 1948
28 Cinberg L B Post Menopausal Pruritus Vulvae *Am J Obst & Gynec* 49 647 657 1945
29 Cormia F E and Lewis G M Contact dermatitis from beetles with report of a case due to the carpet beetle (Anthrenus Scrophulariai) *New York State J Med* 48 2037 1948
30 Cornell E L Vaginal and Rectal Pruritus Etiology and Treatment *Am J Obst & Gynec* 55 691 698 1948
31 Corper H J and Stoner R E Passive transfer of local allergic hyper sensitiveness *Am Rev Tuberc* 54 305 1946
32 Costello M Dermatitis venenata (Dermatitis due to shorts) *Arch Dermat & Syph* 48 676 1943
33 Crepea S B and Cooke R A Study on the mechanism of dermatitis venenata in the guinea pig with a demonstration of skin sensitizing anti body by passive transfer *J Allergy* 19 353 1948
34 Curtis G H Contact dermatitis of eyelids caused by an anti oxydant in rubber fitters of eyelash curlers *Arch Dermat & Syph* 52 262 1945
35 Davids A M and Kurtin A Fatty Acid Therapy of Pruritus Vulvae *Am J Obst & Gynec* 58 396-400 1949
36 Dawson W T and Garbade F A Idiosyncrasy to quinine cinchonidene and ethylhydrocupreine *J A M A* 94 704 1930
37 Deibert O Menger E F and Wigglesworth A M Studies in specific hypersensitiveness Relative susceptibility of the American Indian race and the white race to poison ivy *J Immunol* 8 287 1923

38 De Oreo, G A Dermatitis venenata from contact with marine animals (hydroids), *Arch Dermat & Syph* 54 637, 1946
39 Dobes, W L, and Nippert, P H Contact dermatitis due to nail polish, *Arch Dermat & Syph* 50 270, 1944
40 Dobkewitsch, S, and Baer, R L Eczematous cross hypersensitivity to azodyes in nylon stockings and to paraphenylenediamine, *J Invest Dermat* 9 208, 1947
41 ——, and Sidi, E Exeema de la face provoque par un collyre au sulfate d atropine *Bull Soc franc de dermat et syph* 55 60, 1948
42 Dore, S E Contact dermatitis in a morphine factory, *Brit J Dermat* 56 177, 1944
43 Ellis, F A Contact dermatitis due to "leg make up" *Arch Dermat & Syph* 49 197 1944
44 ——, and Givesburg L Hair lacquer pad dermatitis, *Arch Dermat & Syph* 49 198 1944
45 Epstein S Personal communication
46 —— and Macaulay W L Allergic skin diseases, *Ann Allergy*, 6 442 1948
47 Feinberg S M and Watrous R M Atopy to simple chemical com pounds sulfone chloramides *J Allergy*, 16 209, 1945
47a Duke W W *Asthma, Hayfever, Urticaria and Other Manifestations of Reaction* St Louis C V Mosby Co, 1925
48 Feldman M O Contact dermatitis from the topical application of streptomycin ointment, *Arch Dermat & Syph* 57 1048, 1948
49 Fisher, B Dermatitis following local application of sulfanilamide, *M J Australia* 2 449 1944
50 Forbes, S B and Blate, W C Fatality resulting from use of Lash lure on eyebrow and eye lashes, *J A M A* 103 1441, 1934
51 Franks, A G Contact dermatitis due to "Ace Adherent," *J Allergy* 17 112, 1946
52 Frei W Ueber willkuerliche Sensibilisierung gegen chemisch definierte Substanzen II Untersuchungen mit Neosalvarsan am Tier, *Klin Wchnschr* 7 1026 1928
52a Furman D, Fisher, A A, and Leider, M Allergic eczematous contact type dermatitis caused by rubber sponges used for the application of cosmetics *J Invest Derm*, 15 223 231, 1951
53 Gabriel W B *The Principles and Practice of Rectal Surgery*, ed 4 Springfield, Ill, Thomas, 1948
54 Gaul, E L, and Underwood, G B Epidermal and dermal sensitization from mercury its effect on vision and nail growth, *J Indiana M A* 42 1258 1949
55 —— Primary irritants and sensitizers used in fabrication of footwear, *Arch Dermat & Syph* 60 649, 1949
56 —— The effect of aging solution of silver nitrate on its cutaneous reaction, *J Invest Dermat* 11 7, 1948

57 —— The condensation of phenol and formaldehyde to produce a sensitizer unrelated to the formaldehyde component, *J Invest Dermat* 12 1, 1949

58 —— The failure of fatty acid salts to lessen cutaneous irritation caused by adhesive plaster, *J Invest Dermat* 12 173, 1949

59 Gilbert, J Contact dermatitis from rubber gas mask, *Ann Allergy* 2 339, 1944

60 Ginsberg, J, Becker, F, and Becker, W S Sensitization of guinea pigs to to poison ivy, *Arch Dermat & Syph* 36 1165, 1937

61 —— Cutaneous sensitization studies II Gross and microscopic changes in ragweed and dinitrochlorobenzene sensitization of guinea pigs and in poison ivy sensitization of human beings, *J Invest Dermat* 2 81, 1939

62 Goldman, L, Feldman, M D, and Altemeyer W A Contact dermatitis from topical tyrothricin and associated with polyvalent hypersensitivity to various antibiotics, *J Invest Dermat* 11 243, 1948

63 Goodman, J, and Sulzberger, M B Acquired specific hypersensitivity to simple chemicals I Eczematous sensitivity to clothing and to cosmetics with special reference to dyes, *J Allergy* 9 136, 1938

64 Gottlieb, P M Sensitivity due to Mercurial diuretics Report of a case of urticaria due to mercupurin *Ann Allergy* 6 518, 1948

65 Grolnick, M Studies in contact dermatitis III Active sensitization with krameria in man *J Invest Dermat* 1 179, 1938

66 —— Studies in contact dermatitis IV The spontaneous flare up of negative test sites in experimental sensitization in man, *J Immunol Derm* 41 127, 1941

67 —— Studies in contact dermatitis V Intra uterine transmission to the infant of artificially induced contact type dermatitis, *J Invest Dermat* 4 239, 1941

68 ——, Bowman, K L, and Walzer, M The response of contact dermatitis sites in atopic individuals to subsequent stimulation with specific wheal inducing atopens *J Allergy* 16 188, 1945

69 Hailey, J Pruritus Ani et Vulvae *J A M A* 139 837-840, 1949

70 Hall F A Contact dermatitis due to pigment in zinc-chromate primer, *Arch Dermat & Syph* 52 279, 1945

71 —— Occupational contact dermatitis of aircraft workers, *J A M A* 125 179, 1944

72 Hand, E H Contact dermatitis due to cape weed, *Arch Dermat & Syph* 49 331, 1944

73 Hauffer H Tests for eczema (method and results), *Arch f Dermat & Syph* 162 517, 1931

74 Haxthausen H Further experiments on sensitization of the skin with dinitrochlorobenzene, *Acta dermat venereol* 21 158 1940

75 —— Pathogenesis of allergic eczema elucidated by transplantation experiments on identical twins, *Acta dermat-venereol* 23 438, 1943

76 Heinbecker, P Studies in hypersensitiveness XXXIV The susceptibility of *Eskimos to an extract from toxicodendron radicans, J Immunol 15* 365, 1928

77 Higgins, E L, and Kindel, D J Exfoliative dermatitis from contact with DDT, *J Invest Dermat 12* 207, 1949

78 Hill, W R Etiologic relationship between dermatophytosis and pruritus ani, *Tr Am Proct Soc 41* 210 222, 1940

78a —— Leukoplakia, Pruritus and Senile Changes *Progress in Gynecology,* Meigs and Sturgis, editors New York, Grune & Stratton 145 151, 1946

79 —— Rubenstein, A D, and Kovacs J Dermatitis resulting from contact with moths *J.A M.A 138* 737, 1948

80 Hollander, A Allergic dermatitis caused by hair lacquer products, *Arch Dermat & Syph 48* 656, 1943

81 Hollander, L Contact dermatitis produced by tincture of merthiolate, *Arch Dermat & Syph 50* 123 1944

82 Hollstrom E The effect of tertian fever on epidermal allergy, *Acta dermat venereol 28* 553, 1948

83 Hopkins H Personal communication

84 Horsfall, F L Jr Formaldehyde hypersensitiveness — an experimental study, *J Immunol 27* 569 1934

85 Howell J B Contact dermatitis *Arch Dermat & Syph 53* 265 1946

86 —— Contact dermatitis from cold permanent waving *Arch Dermat & Syph 49* 432 1944

87 Jaenicke, K Personal communication

88 Jadassohn J Observation on sensitization and desensitization in eczema *Klin Wschnschr 2* 1680, 1923

89 —— Zur Kenntnis der medikamentoesen Dermatosen *Verhandl d deutsch Dermat Gessellsch Graz* 1895

90 Jeffcoate, T N A Pruritus Vulvae *Brit M J 2* 1196-1200, (Nov 26) 1949

90a Jordan, J W Contact dermatitis due to synthetic resins in shoe linings *Arch Dermat and Syph, 62* 671-678 1950

91 Kalkoff, K W Experimentelle Studien ueber den Vorgang der epidermalen Sensibilisierung, *Arch f Dermat u Syph 186* 493, 1948

92 Keeney, E L, Sunday, S, Gay, L H, and Lynch, K Poison ivy dermatitis Diagnostic value of patch test made with ether extract from fresh leaves and stems of poison ivy plant, *Bull Johns Hopkins Hosp 69* 482, 1941

92a Keil H The Treatment of Acute Poison Ivy Dermatitis with 3 n Pentadecyl Catechol by the Intradermal Route, *Ann Allergy 8* 356 361, 1950

93 Kein, H L Dermatitis due to soap *Arch Dermat & Syph 53* 411, 1946

94 Kirby, W L Personal communication

94a Klauder, J V, and Gross, B A Actual Causes of Certain Occupational Dermatoses, *Arch Dermat & Syph 63* 123 1951

95 Mauder, J V Actual causes of certain occupational dermatoses, *Arch Dermat & Syph* 48 579, 1943
96 ——, Gross, E R, and Brown, H Prevention of Industrial dermatitis with reference to protective hand creams, soap and the harmful role of some cleansing agents *Arch Dermat & Syph* 41 333, 1940
97 Laden, E L Epidermal sensitization to butesin An experimental sutdy on the range of specificity, *J Invest Dermat* 11 119, 1948
98 Landor, J V Dermatitis venenata caused by smoke, *Brit J Dermat* 55 17, 1943
99 Landsteiner, K, and Chase, M W Experiments on transfer of cutaneous sensitivity to simple compounds *Proc Soc Exper Biol & Med* 49 688 1942
100 —— IX Skin sensitization induced by injection of conjugates, *J Exper Med* 73 431, 1941
101 —— Studies on the sensitization of animals with simple chemical com pounds, *J Exper Med* 61 643, 1935
101a Lane, C G and Luikart II, R Dermatitis from local anesthetics *J A M A* 146 716 719, 1951
102 Lane, C Lupus erythematosus and Dermatitis venenata *Arch Dermat & Syph* 54 81, 1946
103 LaVake, R T Discussion of Cornell s paper, *Am J Obst & Gynec* 55 696 1948
104 Leider, L, and Furman D Allergic eczematous contact type dermatitis from odd things in odd ways, *Ann Allergy* 6 693 1948
105 —— Leider, M, and Baer, R L The present status of passive transfer antibodies in allergic eczematous contact type dermatitis Failure to demonstrate passive transfer antibodies, *J Invest Dermat* 10 425 1948
105a Leider M, and Schwarzfeld, H K Allergic eczematous contact type dermatitis caused by cocobolo wood, *Arch Dermat and Syph*, 62 125 130 1950
105b Leifer, W Contact dermatitis due to cinnamon, *Arch Dermat & Syph* 64 52, 1951
106 Levin S J, and Mon, S S Contact dermatitis from Streptomycin, *Arch Dermat & Syph* 59 663, 1949
107 Lewis, J M Contact dermatitis like lesions following intranasal applica tion of ephedrine, *Arch Dermat & Syph* 49 379, 1944
108 Lewis, J L Dermatitis venenata due to tannins, *Arch Dermat & Syph* 50 138, 1944
109 Loftus, E Personal communication
110 Low, C *Anaphylaxis and sensitization* New York, Wm Wood 1935
111 Madden, J F An unusual example of dermatitis due to nail polish, *Arch. Dermat & Syph* 49 197, 1944
112 Mason, H S, and Schwartz, L The toxic principles of poison ivy, *J Am Chem Soc* 64 3058, 1942.
113 Mayer, R L Experimental sensitization with food dyes and cross sensi tization to paraphenylenediamine, *J Allergy* 20 159, 1949

114 McSafferty, L K Hair dyes and their toxic effect, *Arch Dermat & Syph 14* 2, 1926
114a McLean, D W Personal communication
115 McPherson, J R Personal communication
116 Mendelsohn, H V Dermatitis from lemon grass oil, *Arch Dermat & Syph 50* 34, 1944
117 Miescher, G Beitraege zur Ekzemfrage I Zur Frage der Spezifitaet der ekzematoesen Hautreaktion, *Arch f Dermat u Syph 173* 117, 1936
118 Milford, E L The specific activity of pollen oil, *J Allergy 1* 331, 1931
119 Mitchell, J H Resorcin anal dermatitis due to resorcin anisol suppositories, *J A M A 101* 1067, 1933
120 —— Discussion of Hailey's Paper, *J A M A 139* 837, 1949
121 Nexwand, P H The cellular content of exudates from eczematous and toxic patch test reactions, *J Invest Dermat 13* 85, 1949
121a Niedelman, M L, and Cleier, A Ammonia dermatitis Treatment with diaparene chloride ointment, *J Pediat*, *37* 762-764 1950
122 Norman T Contact dermatitis due to finger paint, *J A M A 137* 535, 1948
123 O'Farral, A M Dermatitis venenata due to mistletoe, *Arch Dermat &* Syph *48* 416, 1943
124 Omens, D V Dermatitis venenata due to hair dye, *Arch Dermat & Syph 54* 97 1946
125 Peck, S M Dermatitis from carrots *Arch Dermat & Syph 49* 266, 1944
126 —— Dermatitis from cutting oils solvents and dielectrics including chloracne, *J A M A 125* 190, 1944
127 —— Dermatitis from dehydration of potatoes, *Arch Dermat & Syph 52* 9 1945
128 ——, and Feldman, F F Contact allergic dermatitis due to the procaine fraction of procaine penicillin, *J Invest Dermat 13* 109, 1949
129 ——, Rosenfeld, H L K, and Glick, A The mechanism of adhesive plaster irritation *J Invest Dermat 10* 367, 1948
129a Pillsbury, D M Physiologic principles in the management of dermatitis *New England J Med*, *244* 423-429, 1951
130 Pincus, H Personal communication
131 Plotz, M Hair lacquer dermatitis in infants from contact with mother's hair, *Am J Dis Child 68* 409, 1944
132 Polak, M and Mom, A M Histopathology of experimental eczema (allergic contact type eczematous dermatitis) in man, *J Invest Dermat 13* 125 1949
133 Pratt, A G, and Corsen, E F Spread of dermatitis by vesicle contents, *Arch Dermat & Syph 51* 316, 1945
134 Rattner, H Dermatitis of the Eyelids, *J A M A 103* 180, 1934
135 ——, and Graffin, J Dermatitis following ingestion of Pyrobenzamine, *Am Pract 2* 754, 1948
136 Riordan, T Personal communication

137. Robinson, S M, and Bereston, E S Contact dermatitis due to mercury of amalgam dental fillings, *Arch Dermat & Syph* 59 116, 1949
138 Rockstad, I Skin reaction caused by fractions of oil of turpentine and hexanitrodiphenylamine, *Acta dermat-venereol* 26 1, 1946
139 Roflumare, S, Orland, J F, and Flesch, P. Group specificity of epidermal allergy to procaine in man, *J Invest Dermat* 6 191, 1945
140 Ronchese, F *Occupational marks* New York, Grune and Stratton, 1948
141 Rostenberg, A Studies on eczematous sensitization I The route by which the sensitization generalizes, *J Invest Dermat* 8 345, 1947
142 Rostenberg, A, Jr, and Kanof, N M Studies on eczematous sensitizations: Specificity of sensitization from point of view of chemical configuration, *J Invest Dermat* 6 201, 1945
143 Rothmann, H Personal communication
144 Sachs, W, Miller, C C, and Gray, M Histopathology of eczematoid dermatoses *Ann Allergy* 2 289, 1944
145 Samitz, M H. Eczematous and pustulous eruptions of the hands *Arch Dermat & Syph* 59 145, 1947
146 ——— Eczematous contact dermatitis due to mercurials *Arch Dermat & Syph* 50 10, 1944
147 Saunders, T S Dermatitis from Tyroglyphidae in handlers of straw, *Arch Dermat & Syph* 50 245, 1944
148 Schmitt, C L Present status of Quinacrine (atabrine) dermatitis, *Arch Dermat & Syph* 59 16, 1949
149 Schreiber, W, and Mueller, W Basic studies on the question as to how sensitization spreads through the epidermis, *Dermat Wchnschr* 107 1393, 1938
150 Schreus, H T Spread of sensitivity through the anatomic structure of the skin, *Klin Wchnschr*, 17 1171, 1938
151 Schwartz L Actual Causes of dermatitis attributed to socks, *Pub Health Rep* 49 1176, 1934
152 ——— Dermatitis from explosives, *J A M A* 125 186, 1944
153 ——— Dermatitis from plain fabrics, *Arch Dermat & Syph* 55 258 1947
154 ——— Sensitivity to external irritants in industry, *New York State J Med* 36 24, 1936
155 ——— A standardized patch test, *Ann Allergy* 8 63, 1950
156 ——— An unusual form of occupational dermatitis, *Arch Dermat & Syph* 50 25, 1944
157 ———, and Peck, S Allergic dermatitis due to metallic cobalt *J Allergy* 16 51, 1945
158 ———, and Peck, S *Cosmetics and dermatitis* New York, Hoeber 1946
159 ———, and Tulipan, L *Occupational diseases of the skin* Philadelphia, Lea and Febiger, Sept, 1939
159a Shaffer, B, Burgoon, C F, and Gosman J H Acute glomerulonephritis following administration of rhus toxin *J A M A* 146 1570 1951
160 Shaw, L Dermatitis due to shoes, *Arch Dermat & Syph* 49 191, 1944
161 Shea, J J Personal communication

162 Shelmire, B The etiology of eczema, *Southwestern Med* *17* 297, 1933
163 —— Cit Urbach, E *Allergy* New York, Grune & Stratton, 1943
164 Shelton, J M Dermatitis due to nail polish foundation, *Arch Dermat & Syph* *48* 197, 1943
165 Simon, F A Allergen in human dander, *J Allergy*, *15* 330, 1944
166 ——, Simon, M G, Rackemann, F M, and Dienes, C The sensitization of guinea pigs to poison ivy, *J Immunol* *27* 113, 1934
167 —— Study of atopic eczema, *Ann Allergy* *6* 584, 1948
168 Skinner, L, and Gables, C Contact dermatitis due to phenophthalein, *Arch Dermat & Syph* *59* 338, 1949
169 *Snow, J, and Harley, R Dermatitis venenata and Kerato-conjunctivitis* caused by the manzanillo tree *Arch Dermat & Syph* *49* 236, 1944
170 Spain, W C, and Cooke, R A Studies in Specific Hypersensitiveness XXVII Dermatitis Venenata observation upon the use of a modified extract from toxicodendron (L), *J Immunol* *13* 93, 1927
171 ——, Newell, J M, and Meeker, M G The percentage of persons susceptible to poison ivy and poison oak *J Allergy* *5* 571, 1934
171a Spies, T D, and Stone, R E The effect of the local application of synthetic cortisone acetate on the lesions of iritis and uveitis, of allergic dermatitis, and of psoriasis *South M J* *42* 871-874, 1950
172 Stewart, S G, and Cormia, F E Experimental nickel dermatitis, *J Allergy* *5* 575, 1934
173 Stokes, J H Clinical analysis of pruritus ani, *Internat Clin* *1* 147, 1940
174 Stokes, J H, and Lee W E Contact Infected Allergic dermatitis of the hands, *J A M A* *123* 195 1943
175 Stone, H B Pruritus ani Treatment by alcohol injection *Surg, Gynec & Obst* *42* 565, 1926
176 Strauberg, J *Occupational dermatoses and their control, Acta dermat venereol* *20* 613, 1939
177 Strauss, H W Artificial sensitization of infants to poison ivy, *J Allergy* *2* 137, 1931
178 —— Experimental study of the etiology of dermatitis venenata, *J Allergy* *5* 568, 1934
179 ——, and Coca, A F Studies in experimental hypersensitiveness in the rhesus monkey III One the manner of development of the hypersensitiveness in contact dermatitis, *J Immunol* *33* 215, 1937
180 Strauss, M G, and Spain, W C Studies on poison ivy and other dermatitis-producing plant parts wherein active resinous principles are suspended in aqueous solution, *J Allergy* *17* 1, 1946
181 ——, Sulzberger M B, and Baer, R L Sensitization to simple chemicals III Relationship between chemical structure and properties and sensitizing capacities in the production of eczematous sensitivity in man, *J Invest Dermat* *1* 45, 1938
182 ——, and Katz, J H The absence of skin irritants in the contents of vesicles, *U S Nav M Bull* *41* 1259, 1943

183 ——, and Rostenberg, A, Jr Acquired specific supersensitivity (allergy) to simple chemicals, method of experimental sensitization, and demonstration of increased susceptibility in individuals with eczematous der-dermatitis of contact type, *J Immunol* 36 17, 1939

184 ——, Sulzberger, M B, and Wolf, Jack *Dermatologic Therapy* Chicago, Ill, Yr Bk Pub, 1942

185 Sulzberger, M B *Dermatologic allergy* Springfield, Ill, Thomas, 1940

186 Sutton, R L, and Sutton, R L, Jr *Diseases of the Skin* St Louis, Mo, Mosby, 1935

187 Swinny, B Allergic dermatitis from vaginal absorption of sensitizers (Floragmic and Verajeptal), *Ann Allergy*, 5 490, 1947

188 Swinton, N W Pruritus Ani *New England M J* 236 5, 169, (Jan) 1947

189 Taylor, W Dermatitis from Army spectacles, *Brit M J* 2 40, 1945

190 Thomas, J W Contact Dermatitis from streetcar seats or so called street car rash, *Ann Allergy 1* 162, 1943

191 Traub, E Dermatitis venenata from rubber gloves *Arch Dermat & Syph* 53 205, 1946

192 Tuft, L *Clinical Allergy* Philadelphia Lea, 1949

192a Tzanck, A, and Sidi, E *Les Dermatoses Allergiques* Masson and Co, Paris VI, 1950

193 Urbach, E *Allergy* New York Grune and Stratton, 1943

194 Van Rhee G Contact dermatitis caused by zinc chromate paint, *Arch Dermat & Syph* 53 403 1946

195 —— Contact dermatitis due to frequent contact with thinner *Arch Dermat & Syph* 53 405, 1946

196 Vaughan, W T, and Black, H J *Practice of Allergy* St Louis, Mo, Mosby, 1948

197 Waldbott, G L, and Shea, J J Causative diagnosis of contact dermatitis *Arch Dermat & Syph* 57 975, 1948

198 ——, and Bailey, L J Estrogenic hormone determinations in premenstrual asthma *J Allergy* 13 2, 125, 1942

199 —— Localization, an aid in the diagnosis of contact dermatitis *J Michigan M Soc* 41 392 1942

200 —— The management of allergic eczema *American Practitioner* 59 IV, 1949

201 Weber D Dermatitis due to nail coating *Arch Dermat & Syph* 53 200, 1946

202 Wedroff, N S, and Dolgoff, A P Concerning the specific sensitivity of the skin due to simple chemical compounds *Arch f Dermat & Syph* 171 647, 1935

202a Weinberger, W The Patch Test—Its technic and interpretation *Arch Ind Hyg and Occup Med* 2 565-573 1950

203 Weiss, R Personal communication

204 Whitacre, F M *Dangers from cosmetics* New York, N Y, Schieffelin

205 Whittemore, A L, and DeGara, P F *Sulfadiazine sensitivity*, Presented at the meeting of the Academy of Allergy, 1946

206 Wiener, K *Skin Manifestations of Internal Disorders* (Dermadromes), St Louis, Mosby, 1947

207 Winston, B H Dermatitis of the hands, *Arch Dermat & Syph* 57 357, 1948

207a Winston, J R, and Walsh, E N Chromate dermatitis in railroad employees working with diesel locomotives *J A M A* 147 1132, 1951

208 Wiswell J G, Irwin J W, Guba E F, Rackemann, F M, and Hen, L L Contact dermatitis of celery farmers, *J Allergy* 19 396, 1948

209 Withwell, G Dermatitis due to a case hardening compound, *Brit J Dermat* 57 169 1945

210 Witten, V H Repeated patch testing in allergic eczematous sensitization *Ann Allergy* 7 32 1949

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This Book

CONTACT DERMATITIS

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